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LONG LOOK HOUSE

BY
EDWARD ABBOTT

SILHOUETTE ILLUSTRATIONS BY HELEN MARIA HINDS

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THE LONG LOOK FAMILY.—Frontispiece.

LONG LOOK HOUSE:

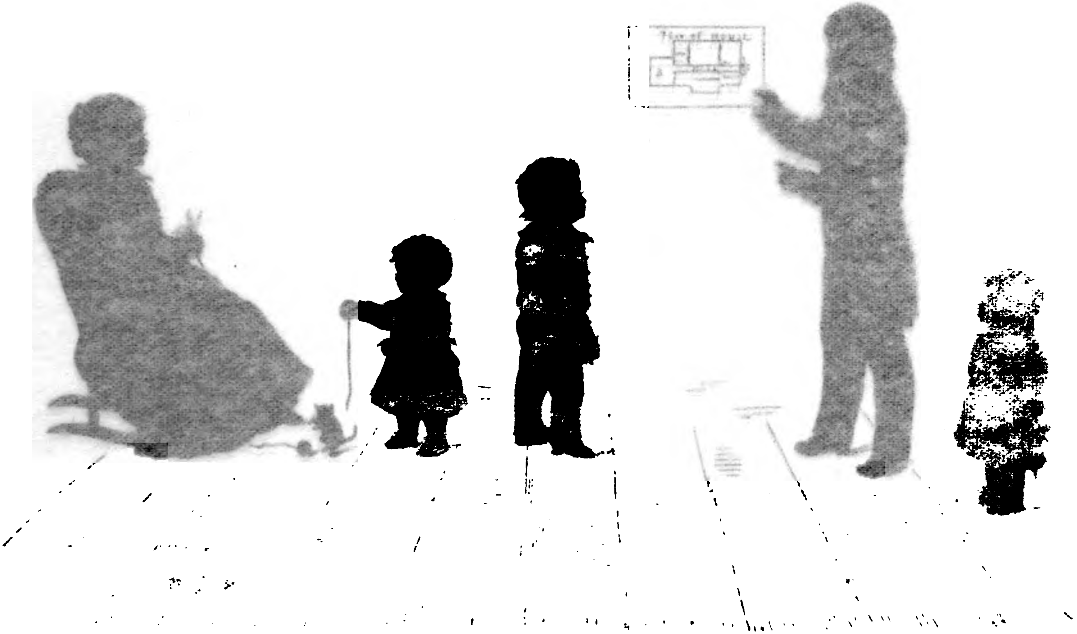
A BOOK FOR BOYS AND GIRLS.

BY

EDWARD ABBOTT.

SILHOUETTE ILLUSTRATIONS BY H. [illegible]

BOSTON.
NOYES, SNOW AND [illegible]
1877.



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16 Oct. 1893.

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PRESS OF THE PUBLISHERS,

TO

MY FATHER:

IN

RESPECT AND AFFECTION.

TO THE READER.

"LONG LOOK HOUSE" is the first volume of a series to be called the "LONG LOOK BOOKS:" intended to afford instructive and wholesome reading for boys and girls of from six to twelve years of age. In general, their aim will be to address the reasoning powers, rather than the emotions; to convey useful information about common things, by means of natural and simple fiction; and, without introducing any theological doctrine, to exert incidentally a moral and religious influence. Whatever defects these pages may reveal, parents may feel confident of this: that they will studiously exclude the "sensational" element, and that in that respect, at least they can be read by their children with safety. I am far from expecting that, as some friendly announcements of the press have said, "they will repeat in this generation the success of the 'Rollo Books';" but I ought frankly to say that I have sought to catch somewhat of the spirit of those famous juveniles, even as I am indebted to their venerated author, my father, for encouragement in the work I have undertaken.

CAMBRIDGE, MASS., OCTOBER, 1876. E. A.

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LONG LOOK HOUSE.

CHAPTER I.

THE HOUSE AND ITS SURROUNDINGS.

"LONG LOOK" may seem at first rather an odd name for a house, but if you were to see this particular house, and all its surroundings, I think you would agree with me that the name is a very good one. The house stands on a gentle slope just where the landscape before it opens away on either side, so that from it one has a distant and pleasant view. Directly in front are broad meadows, through which a river winds; and beyond are hills dotted with houses and edged with spires—the outskirts of the city. Along the border of the meadow runs a railroad, one of the busiest of all that connect the city with the rest of the world. To the right rises a dense grove of pines which keeps the eye from wandering far that side, and on the left begin the houses of the town, which has its centre at the square and post-office a mile away. This is almost the only point in all the town where any broad and far view is possible, but here one may see river and meadow, railway and hill at a glance, and give his eye free range over a wide and varied prospect.

Therefore, "Long Look" seems a very good name.

The house at Long Look is a place for sights not only, but for sounds as well. One sound is the "puff-puff-puff" of the sturdy little steam-tug which sometimes comes up the narrow and crooked river, towing a coaler or a lumberman to the next town, Waterside, at the head of navigation. And when the children of Long Look hear the soft, wheezy breathing by which the tug announces its approach, or the sharp, shrill whistle by which it signals the draw-tender to open the bridge yonder for its passage through, they generally run with one consent to the Green Mountain to hail the stranger. What the Green Mountain is I will tell you by and by.

"What a saucy little thing!" says Max, as he intently watches the tug, plowing its way steadily along, and pulling the schooner after it.

"Yes, but isn't it strong!" responds Jenny, who looks on with undisguised admiration at the feat which it performs.

Another of the sounds at Long Look is the signal-gun, fired every morning and evening at the arsenal up the river. Every morning at sunrise, every evening at sunset, winter and summer, rain or shine, the heavy gun is fired, and its deep boom long made the children start after they came to live within reach of its reverberations.

Another of the sounds that reach Long Look comes from the freight yard of the great railway beyond both river and meadow. There, where the lay of the land gives a chance for it, the two tracks are split up into twenty or thereabouts, and there, by means of other tracks connecting with other roads that enter the city, freight trains are made up or broken up as the case may be. In the day time, when many noises are abroad in the air, and the railway is busiest with bringing passenger trains, there is little or no disturbance from this source; but at night, when all the rest of the world is still, Max is sometimes awakened by the screeching locomotives and the heavy rumble of freight cars, sounding forth upon the empty air. He listens attentively to the whistles—*one* for "down brakes," *two* for "up brakes," *three* for "take out the pin;" and, as he listens, pictures to himself the train stopping, the train moving on, or the train breaking in two as it makes a "running switch," until he gets tired of the noise beyond endurance, and falls asleep.

The house at Long Look is within easy reach of a good many places of interest, which Max and his sisters very much like to visit with their father. "There are three kinds of water near our house," they are in the habit of saying. There is, first, the smooth, winding river, along which, in the row-boat which lies at the pier, not many minutes walk away, they can sail either down past the town, into the shadows of the great city, or up between green meadows, and among villages and fine estates, into the country. Next there is the pond which lies in the opposite direction, a mile away, walled in by hills, where there are sail-boats as well as row-boats, and where, now and then, Mr. Merrill takes his children for a little play at fishing. And finally, between the river and the pond, there is the reservoir, high up upon a swell of land, surrounded by a paved walk and a hard driveway; a pleasant place to go of a summer evening, when the sun is sinking, and the rich clouds are mirrored in the still surface of the water.

Altogether, the house at Long Look, taken with its sights and sounds and surroundings, is a pleasant place; and the life which goes on there, is a pleasant life; and this reading about it I hope will be a pleasant reading.

CHAPTER II.

A HOUSE BUILT TO ORDER.

THE house at Long Look was not yet built at the time when this story really begins. The land was there, and the river and the meadow and the views, but that was all. Max and his father and mother, Mr. and Mrs. Merrill, and his little sisters, Jenny and Maud, were living in another part of the town, two or three miles away. But Mr. Merrill had bought his lot of land, and had named it "Long Look," for the reason I have mentioned, and was now busy with an architect getting out the plans for a house. And every morning at breakfast, and every evening at dinner, he had a great deal to say to and with the others about materials, and rooms, and bay-windows and "finish." Jenny said she thought they might as well turn into a carpenter's shop at once, and be done with it.

"It's a great deal of trouble to build a house, isn't it," said Max, one day at dinner. "I should think, papa, you would go and buy a house, somewhere, already built."

"Yes," replied his father, "we could do that. There are a good many houses now for sale in various parts of the town, and I presume, as we have to leave the one we are now in, we could find one among them that would suit us very well. It would save us a good deal of trouble to buy a house outright, all standing, and move directly into it without any delay. But then, on the other hand, there are some very excellent reasons why in our case it is a good plan to build for ourselves. I think there are as many as five such reasons."

"What are they?" asked Max.

"The first," said his father, "is that we are in no special hurry to move. It is now March, and this house we have to keep any way till next September. We have all the summer before us, and so there is plenty of time to build."

"What is the second reason?" asked Max.

"The second reason," replied his father, "is that if we build *our own* house, we can choose the place for it. If we *buy* a house we have to take it where it stands, and the place may not be a convenient one, or the street may not be a pleasant one. I have seen a good many houses which I think your mother and I would like very well, if only they were in a different place."

"Couldn't you move them?" asked Jenny.

"No," said her father, "not very well. It is not easy to move a large, good house. But up at Long Look," he continued, "we have the very place we want, a nice street, plenty of land, pleasant views, and everything just about as we would like."

"Now for the third reason," asked Max.

"The third reason," continued Mr. Merrill, "is rather a private notion of my own than a regular reason. It is that a house is to the family that lives in it just as a suit of clothes is to a boy or to a man. You can go to a store and buy a suit of clothes ready made, and get a tolerable fit, but a better way is to go to the merchant tailor's and be measured for your suit, and then you can be sure it will fit. At least that is the better way for men. Besides you can choose just the cloth you want then. I think it is very nearly so with houses; better to measure the family and have the house built to order than to buy one ready-made."

"You see, we want a very different kind of a house from the Spragues, for instance. There, there are a father and a mother, and a brother and an aunt, that's four; and three grown up young ladies, seven; and two sons, nine; and three house-servants, twelve; and the man, thirteen; besides a great deal of company all the time. And here are we, only six of us, your mamma and I; and you and your little sisters; and Carry Ann. Now how foolish it would be for us to buy a house that the Spragues would buy, and how impossible it would be for them to get into a house that would do for us very nicely."

Carry Ann was the servant in the kitchen.

"If we build our own house," continued Mr. Merrill, "we know exactly what we want, and can suit ourselves exactly."

"Then there is another reason in favor of building our own house. We know what kind of a house we have, if we order it and see it built under our own eyes. Ready-made houses *may* be good and may not be. There are a good many dishonest people in this world. And some of them are house-builders. It is very easy to cheat in building a house. The builder, if there is nobody to watch him, can slight his work at every point. He may get poor materials, and hire cheap workmen, and have the work done hurriedly and carelessly, so that a poor house is the result. That's the way Mr. Nixon builds his houses and sells them at such low prices. He paints them all up, so that when they are new they look very nicely, and people say, 'What pretty houses!' but after one has been used a little while the freshness and beauty all disappears; the paint fades, the timbers warp, the doors stick, the plastering cracks, the floors settle, and whoever buys it finds that he has been sold, as well as the house."

Max laughed.

"But if we build the house ourselves," continued his father, "we can agree just what kind of materials shall be used, and how the work is to be done, and can watch the work as it is done, and if it is not done well we can complain and have it done right, and so when the house is finished we can know that the inside is all that the outside shows to be, and that we have not got a poor job all puttied and painted up so as merely to look well."

"And now what is the fifth reason?" asked Max, "you said there were five reasons."

"The fifth reason," said his father, "is the pleasure that it gives us. In the first place we had a great deal of pleasure last fall in driving about and selecting our lot. Now, your mother and I are having a great deal of pleasure in talking over the plans and deciding all the various questions as they come up. Next summer you children will have a great deal of pleasure watching the work of building as it goes on. And when the house is all finished we shall have a great deal of pleasure in moving in and getting settled."

"But we should have *that* just the same, should n't we, if we did n't build it ourselves?" suggested Jenny.

"Yes," replied her father, "so we should, I did n't think of that. But at any rate I think we shall all enjoy building the house very much."

And to this statement nobody took any exception.

CHAPTER III.

A HOUSE FOR COMFORT.

THE next morning at the breakfast table the conversation about house planning and building was continued.

"I did not finish last night," said Mr. Merrill, "all I had to say about building our house to suit ourselves. And if you would like, I will finish now."

"Yes," said the three children together, little Maud, with her mouth full of a piece of muffin, loudest of all. It was the first time she had had anything to say on the subject, though she was generally a very attentive listener to whatever the others had to say.

"What was the third reason I gave in favor of building our own house?" asked Mr. Merrill.

"So as to make it fit us," replied Max, after a moment's reflection.

"Like a suit of clothes," added Jenny.

"Yes," replied their father, "well, there are several things to be said on that point. Besides having as many rooms as we want, and the right sized rooms, and all that, I think it is very important that in this part of the country a house be built for winter rather than for summer.

"How for winter?" asked Max.

"So as to keep out the cold," replied his father. "You have heard, haven't you, of building stores *fire* proof, so that they will not take fire, or if they do take fire will not burn up?"

"How do they build them fire proof?" asked Jenny, interrupting.

"By using materials that do not burn," answered her father. "Wood, if it catches fire, will burn very easily. But bricks will not burn, nor stone, nor iron, and by using such materials as these, and taking especial care in the work, the building is made proof against burning up, or even taking fire, though I believe there are really very few thoroughly fire-proof buildings."

"Now, as I was saying before, I think that in a country like ours, that is in our part of the country, we ought to build our houses *cold* proof. In the summer we can get along comfortably enough, and in the hottest part of it we can go away, too, to the mountains or the sea-shore. But in the winter we can't well go away where it's warmer. All we can do is to keep ourselves as warm as possible at home. You know our winters are very long—let me see, just how long are they?"

"Six months, are n't there?" asked Max, counting them: "November, December, Febru— no, January comes next, February, March—there are only five, not six."

"Only five real winter months," replied his father, "but April is almost always cold and chilly here, and so, sometimes, is the last part of October. I think it would be quite safe to say that for six months in the year we have to make a business of keeping warm, and I hold that a house ought to be so built as to help that business along and not hinder it."

"With a good, big furnace," suggested Max.

"Yes," said his father, "but with something more than that. In keeping a house warm a great deal more depends upon the plan of it, and upon the means taken in building it, than many people think for. When you go out doors on a cold winter day what do you do to keep warm?"

"Put on our overcoats," said Max.

"And our arctics," said Jenny.

"And our mittens," said Maud.

"Precisely so," said Mr. Merrill. "Well, now, a house needs good thick walls for a coat, and good thick floors for arctics. But there is something else I am thinking of. When you are out on such a cold winter day as that, walking or standing against an icy wind, what do you do to keep warm?"

"Run," said Jenny.

"Turn 'round, back to the wind," said Max.

"That's it," said Mr. Merrill, "back to the north wind, face to the sun. Now that's exactly the way, it seems to me, a house ought to stand, back to the north, front to the south. This house, that we now live in, stands just the other way, front to the north and back to the south, and that is one thing which makes it such a cold house. Don't you know how the doors and windows rattle when the wind blows, and how hard it is when the thermometer gets down below zero to keep our rooms warm, no matter how hot a fire we keep in the furnace? Our new house is going to stand with one of its back corners toward the north; and in that same corner is going to be the kitchen, which is always warm with the fire in the range; and all the rest of the rooms, being protected from the winter winds by the kitchen, and facing the other way, towards the sun, will be so much the gainers."

"I think that's a very good plan," said Max, "don't you, Jenny?"

"Yes," said Jenny, "I'm sure I do."

"And so do I," chimed in little Maud.

"There is one more thing I want to say about building our own house," added Mr. Merrill, "we have only about so much money to spend upon it, and we can't afford to pay for any filagree work."

"What is filagree work?" asked Max.

"Oh, ornaments," replied Mr. Merrill, "things to make a house look pretty; brackets and mouldings, and carvings and turnings, and cornices, and all such things."

"Don't you like such things, papa?" asked Jenny. "I'm sure I think they are very pretty."

"Yes," said Mr. Merrill, "I like them well enough in their place, but I don't like them in place of other things that are much more important. Comfort first, ornament afterwards, is my idea. If we had money enough to have the comforts and ornaments too, I should be very glad, perhaps, but we have n't. Ornaments cost a good deal, and if we choose *them* we must give up some of the comforts. And I think it's a great deal more important for us to have a thoroughly built house, a convenient house, and a warm house, than it is to have a showy house. Some other people who build houses think differently. They spend their money on the outside, where it can be seen; I prefer to spend ours on the inside where it can't be seen, but where it will be *felt*."

"Yes," said Max, "I think myself that is the best way."

"Once," continued Mr. Merrill, I knew of a poor boy, who had quite a sum of money given him just as the winter was coming on. His clothing was thin and poor, and he might have gone and bought with his money some thick woolen shirts and a stout overcoat that would have kept him warm and comfortable all winter long. But instead of that he went to a jeweler's store and bought a great ring with a make-believe ruby in it, to wear on his finger, and a great breast-pin with a make-believe diamond in it to wear in his shirt bosom. When the winter came on he shivered in his thin clothes. His fine ring and breast-pin did not keep him warm, and the people in the street were too cold to look at them."

"What a silly boy!" exclaimed Jenny. "I would not have done *that*."

"Nor I," said Max.

"No, I hope not," continued Mr. Merrill. "But was he any more silly than we should be if we were to take the little money we have to spend on a house, and use much of it in buying finery to put on the outside for other people to look at? I mean to spend our money on good lumber, and good workmen, and in making the walls thick and the floors warm, and the whole house just as comfortable and convenient for us who are to live in it as it possibly can be."

And Mrs. Merrill, as well as the children, thought this was a very wise and sensible plan.

CHAPTER IV.

MATERIALS.

THE conversation about the new house continued from time to time, and as Mr. Merrill found his children to be greatly interested in all the plans, and in every detail which was under discussion, he took pains to talk with them freely and fully, and to explain to them whatever they did not understand.

Thus, one evening, not long after the talk about plans recorded in the last chapter, when the family had finished dinner, and were sitting in the library by the windows, looking out over the common at the rich sunset, Mr. Merrill said to the children who were gathered about him:

"I could talk to you some more to-night about house-building, if you would like me to."

"Yes, oh yes!" they all shouted.

"I will tell you about materials," he continued, "and you can ask any questions you wish as I go along. But first I will ask a question or two of you. Max, what are materials — what do we mean by the word?"

"The things out of which any thing is made," replied Max, in a tone as if he were not quite sure he was right.

"Yes," replied Mr. Merrill. "The materials of a bird's nest are sticks and twigs, and hairs and straws. The materials of a book are paper and ink. Now what are the materials of a house?"

"Wood," answered Max, "and brick."

"Yes, and stone," added Jenny.

"And paint, papa," said little Maud.

"Yes, and paint," replied her father, "but I am thinking more now of such building materials as wood, brick, or stone. Do you know of any stone house in Bridgefields?"

Bridgefields was the name of the town in which they lived.

"Yes," said Max, "our church is built of stone, a kind of blue stone, with granite edges."

"But I mean a house," rejoined Mr. Merrill, "a dwelling-house. I don't think there are any stone houses in Bridgefields, at least I don't remember any."

"I wonder why not?" asked Max. "I should think stone was an excellent material, it is so hard."

"So it is," replied Mr. Merrill, "and its very excellence makes it costly, and I presume that is the reason, or one reason, why more stone houses are not built. In some of the towns around stone is more plenty than it is here, and I think in those towns there are a good many stone houses."

"Yes," said Jenny. "Uncle Joe's house in Auburntown is built of stone," "Good building stone, you see," continued her father "is rare. It cannot be made like bricks out of clay, or be grown, like trees, from seed. It is found only in great quarries, in particular places. Then it is hard, and a great deal of labor is required to work it into proper shapes and sizes. Then it is very heavy too, and can be transported from the quarry to the place where it is to be used, or lifted from the ground to its place in the wall, only with considerable difficulty. Then the walls of a stone house, being thicker than ordinary, require more carpenter work, I suppose. All these things make it an expensive material, and one that is not very commonly used. But then it has great advantages. It will not burn up. It doesn't have to be painted. It does n't wear out, and it looks beautifully. I think a handsome stone house is very handsome indeed."

"Now about bricks," said Max.

"Well," continued his father, "bricks are a kind of stone. They are stones, in fact; artificial stones. Granite is nothing but a mass of minerals compacted together by heat, and a brick is nothing but a mass of minerals compacted by heat too. Only the piece of granite was a long time in forming, a great many years; and the brick was made very quickly, in a few hours."

"How do they make bricks?" asked Jenny.

"They take a peculiar kind of clay," replied her father, "which is found in some places, and grind it up in a mill, somewhat as wheat is ground into flour, having first mixed it with water. Then by means of moulds, like mamma's jelly moulds, they shape it into blocks the size of the brick, and after the blocks have dried, pile them up in great piles under a shed. Then when the pile is finished they build fires under the bricks and bake them. When the bricks are baked then they are done."

"Just like bread," interrupted little Maud.

"Yes, just like bread. Before the brick is baked it is of a dull, gray clay color. After it is baked it is bright red. Bricks make a capital building material. They are pretty hard, like stone. They will not burn up any more than stones will. In fact, they will stand heat better than granite. After the great Boston fire many brick walls were to be seen standing intact among the ruins, while granite walls by their side had crumbled into pieces. Then bricks are comparatively light and easy to handle. They can be carried, one at a time, any where, and the hod carrier can fill his hod with them and take it to the top of the highest building without any difficulty. Then bricks do not have to be painted, and they last a long time."

"I think a brick house is a very pretty kind of house," said Max.

"So it is," responded his father, "if it is prettily planned, so as not to be stiff and awkward, and especially if it have woodbines and other vines growing up over it. There are a great many advantages in bricks as a building material, and except in the matter of their cost, I don't know of but one serious disadvantage."

"What is that?" asked Max.

"Dampness," replied his father. "A brick house is certain to be damp, unless it is built in a peculiar manner and with great care. Moisture strikes right through bricks, and if there be but a single layer of them in the wall, when it rained the moisture would soak slowly through, and show in great spots on the plastering within. And if it did not soak through so as to show, it would stay in the bricks themselves, and make the walls damp and the whole house chilly and uncomfortable.

"That's a very bad difficulty, I should think," said Max.

"Yes," said his father, "so it is, and there is only one way I know of by which the builders get over it. They make the walls of the house double, with an air space between. This prevents the dampness from striking through from the outside, and keeps the inside perfectly dry."

"I should think that would make a brick house cost a good deal," said Macy.

"It is a costly kind of house," answered his father, "less so than stone, but more so than wood. That is, commonly so. I suppose there are parts of the world where timber is very scarce, and where bricks, or even stone, would be a cheaper material than wood; just as there are other places where stone may be plenty and bricks scarce, in which case stone would be cheaper. But here in Bridgefields, where there is no special quantity or abundance of either material, brick is cheaper than stone, and wood is cheaper than either."

"And wood makes an excellent material, too," he continued. "Good lumber, well seasoned, is very enduring, and a wooden house, if properly built, can be made exceedingly comfortable, and will last a very long time."

"Is our house going to be of wood?" asked Jenny.

"Mostly," replied her father. "There will be bricks in the chimney, and brick and stone in the foundations, and stone on the roof for slates; but the house itself will be of wood. Really, we can say that it will be built of all three materials."

"I'm glad of that," said Max.

"So am I," said Jenny.

"And I am glad, too," added little Maud.

"Yes," said their father. "And I think it is going to be a very nice house, indeed."

CHAPTER V.

CONTRACTS AND BUILDERS.

ONE pleasant spring morning, just after the snow had all melted away, and when the ground had nearly settled into its summer condition, Mr. Merrill said to Max, as they sat at the breakfast table:

"Max, would you like to go up to the lot with me this morning to stake out the cellar? Mr. Stowe is going to begin work this morning, and I am going up to help him."

Mr. Stowe was the builder.

"Yes," said Max, "I should like to go very much indeed."

Jenny and Maud both said that they would like to go too, but Mr. Merrill thought they had better not and they acquiesced very pleasantly in his decision.

"There are two ways in which we can go," continued Mr. Merrill, still addressing Max. "We can take the horse cars and ride right up to Elm street, or we can walk; that is, I can walk, and draw you in your little wagon."

Max was at a loss for a moment which plan to choose. He liked his wagon, and a ride in it at his father's hands was a great pleasure. He liked the horse-cars too, especially the friendly greetings he got from some of the conductors whom he knew, and the paying of his own fare with tickets or money which he carried in his pocket. But finally he decided to take his wagon.

"Perhaps," said he, in explanation of his choice, "Mr. Stowe will want *me* to help him, and then my wagon will be very useful."

So, a few minutes after breakfast, Mr. Merrill and Max set out, Max in his wagon and his father drawing him. Mrs. Merrill and Jenny and Maud came to the door to see them off. It was a beautiful morning. The sun was shining brightly, the grass in the yards was beginning to look quite green, and the birds were singing very merrily.

"I could give you another talk on house-building," said Mr. Merrill presently, after they were fairly started, "if you would like to have me."

Max said he should like it very much indeed, so Mr. Merrill began.

"We have had quite a number of talks," said he, "about plans and materials. I think this morning I will go over the whole subject rapidly, by way of a review."

"What is the first thing a man does when he is going to build a house?"

"Buys a lot of land," said Max.

"Yes," replied his father, "he always buys a lot of land, of course; but, I mean, what is the first thing about the house itself?"

"He makes the plans," said Max.

"Yes, that's it," continued his father, "he makes his plans. Sometimes he draws the plans himself, and sometimes he has an architect draw them. After the plans are drawn, and the specifications are made, then he gets estimates."

"What are specifications?" asked Max.

"They are the directions which the architect gives for all the minute details of the house. He specifies how large the timbers are to be, the quality of the lumber, the style of the finish and of the trimmings about the doors and windows, and all the other particulars which go to make up the house. It would not be enough to have drawings of the different parts alone; there must be very precise and careful specifications, and the builder must go according to the specifications as well as the drawings."

Mr. Merrill was right in saying this, as far as he went, though he might have explained to Max that there are two ways of building a house; one by contract, the other by day's work. In the first case, the man for whom the house is to be built engages some builder to do the whole work according to the plans and specifications which have been prepared. He pays him a certain sum agreed upon for this work, and the builder undertakes to do it thoroughly and faithfully. In the second case, the man buys his own materials, and himself hires such carpenters, masons, painters and other mechanics as may be needed, paying each by the day, and either himself superintending the work as it proceeds, or employing some competent and trustworthy person to do it. With plenty of money and time at hand the latter plan is an excellent one, as it allows the owner to make his own selection of materials and men, and to carry out his own ideas as he goes along. The former plan is the one more commonly pursued, and if the contractor be honest and faithful, it is generally satisfactory. Mr. Merrill had decided to build his house by contract. He reasoned that if he had had plenty of money, and nothing in particular to do, it would have been a very pleasant occupation for him, during the summer, to superintend the building of his own house, going to the lumber yards and hardware stores as occasion required, making his own purchases, and hiring and directing his own men. But then he had not plenty of money, and his business duties in the city kept him very busy. He had laid by a particular sum towards his house, and could not well increase it. And to give up his business for the purpose of superintending masons and carpenters and attending to all the minute details of the building of a house, would be poor economy. Besides, he did not know anything about those details. He knew nothing of the qualities and values of materials, or of the various trades and arts included in the work of building, and he considered that it would be far wiser for him, having settled on his plans, to make a contract with some competent builder, whom he could trust, for the faithful performance of the entire work. This, accordingly, was the plan which he had adopted, and it was this he had in mind in what he was now saying to Max.

"When the plans and specifications are ready," he continued, "the owner generally goes to two or three different builders, and asks each one to estimate how much money he will build the house for. The builder examines the plans and studies the estimates, and then carefully calculates at what price he can afford to take the contract. Then when the owner has the several estimates before him he selects whichever offer he thinks the most advantageous."

"Did Mr. Stowe estimate on our house?" asked Max.

"Yes," replied his father.

"And did any body else?"

"Yes, Mr. Rideout and a Mr. Bower."

"Why did n't you get one of them to build it?"

"I did not get Mr. Rideout because his estimate was a good deal higher than Mr. Stowe's. And I did not get Mr. Bower because, though his estimate was lower than Mr. Stowe's, I heard some things about him that made me afraid to trust him. Mr. Stowe offered to take the contract at what seemed to me a fair price, all things considered, and as he is a man whom I can trust, I concluded to take him."

"How could you trust Mr. Stowe?" asked Max.

"Because I have known him a great many years. We used to be boys together, going to the same school and playing in the same fields. His name was Henry—Henry Stowe. His father was a carpenter, too, and many 's the time I've been of a Wednesday or Saturday afternoon to play with him in his father's shop. We used to find all sorts of queer blocks and pieces of wood in the shop, and sometimes his father would give us pieces of boards and let us use some of his tools at an old bench in the corner, and we used to make squirrel traps, and cages, and all sorts of things."

"Well, Henry grew up to be a carpenter like his father. For a long time he worked for his father, and after he had learned his trade, and his father had died, he began to work for himself. He was industrious, intelligent, honest and faithful. People found that they could trust him with little jobs, and so presently got to employ him in big ones. By and by he found himself with so much work to do that he had to hire other men to help him, and now I suppose he builds as many houses as any man in town—and as good ones, too."

"And is he going to build *all* the house," asked Max, "chimneys and all?"

"No," said his father, "no builder does that. He *undertakes* to have all the house built. Then he does what he knows how and can do himself, and gets other mechanics to do the rest. For instance, Mr. Stowe, I suppose, will hire one man to dig the cellar, and another to lay the cellar wall, and another to build the chimneys, and another to do the plastering, and another to do the painting; while his own men will do all the carpenter-work. But he will be there every day to superintend the work, to see that the plans are carried out, to direct the workmen and keep them busy, and have everything done in the right way."

"And shall you pay all the men?" asked Max.

"No," replied his father, "the contract is that Mr. Stowe is to hire all the men, such as he pleases, on his own terms; and I am to pay him for the whole work, all in one lump."

"That's a very easy way, I should think," said Max.

"Yes, it is," replied Mr. Merrill. "It's a great deal easier than the old way, a hundred years ago, for instance, when in a great many parts of the country everybody had to build his own house as well as he could, and then one man would have to do carpenter-work, mason-work and all. The new way is by what is called the *division of labor*, and it makes all kinds of work go a great deal smoother and better. It is very interesting to see how the division of labor is carried into all departments of life, and sometime I will tell you more about it. But now we are almost at our lot, and, see! there is Mr. Stowe waiting for us."

Max stood up as well as he could in his jolting little wagon, and sure enough, there was Mr. Stowe in a plot of open ground at a little distance. He seemed to be digging with a long shovel, and on the edge of the street, by the sidewalk, a large express wagon was hauled up, out of which a man whom Max did not know was throwing some short pieces of board.

"Why!" exclaimed Max, "he's gone to work already; let's hurry along."

CHAPTER VI.

STAKING OUT.

ON reaching the spot, Mr. Merrill and Max found that Mr. Stowe had indeed begun some kind of operations. His coat was off, and with a long handled shovel he had dug quite a hole in the ground, and, standing in it up to his knees, was still digging on with great energy.

"Good morning, Mr. Stowe, "said Mr. Merrill as he drew near. "You have begun bright and early."

"Yes," said Mr. Stowe, "I thought I would see what sort of soil we had to work here."

"Are you afraid of clay?" asked Mr. Merrill.

"I was, a little, before I began," said Mr. Stowe, "but my fears are fast disappearing. I guess there is nothing but gravel and sand, clear down as far as we shall want to go."

"You see, Max," said his father, as they stood looking on, "the question about soil is a very important one. It makes a great deal of difference whether a house be built upon a sandy and porous soil, or on one that is clayey and impervious."

"What is porous and impervious?" asked Max, holding his father's hand, and looking down into the hole which Mr. Stowe was digging.

"*Porous*," replied his father, "means full of holes. A sponge is porous. *Impervious* means impassable. A stone is impervious to water, but gravel and sand are porous, and so pervious."

"Are there holes in sand?" asked Max in a tone of surprise.

"Yes," said his father, and stooping he took up a handful of the gravel which lay at his feet. It was a coarse gravel, made up of grains of sand and pebbles of various sizes. "Look," said his father, "do you see how loosely it lies together? If you were to pour a pail of water on a pile of such gravel as this the water would all soak away in a moment or two. But if you were to pour the water on a bed of clay, it would not soak away; not, at least, for a great while. Do you remember how wet it always is on Ellis street about Aunt Katherine's, after a rain?"

"Yes," said Max.

"That," continued his father, "is because the *subsoil*, that is the under soil, of that part of the town is clay; and the water which falls cannot soak away very far. But on Miller street, where the Spragues live, it dries up very fast after a rain, because the soil is gravelly like this, and soaks up the rain, just as mamma soaks up the water with her sponge in the bath-tub."

"Only," said Max, "in the bath-tub the water is at the bottom, and the sponge is on top."

"Yes," said his father, "precisely."

"I should n't think," said Max "that people would build houses on clayey ground."

"They don't," replied his father, "when they can help it. At least, it is a great deal better to build on gravelly ground; and that is what Mr. Stowe is now trying to find out. I think from the appearances, that we are all right. I had not much doubt about it before. I have noticed, driving past here, that there was never any standing water, and I have no doubt that we shall have a cellar as dry as a barrel."

"Well," said Mr. Stowe, jumping out of the hole and throwing down his shovel, "we have a fine morning to begin, and if you are ready, we will stake out the cellar right away." So saying, he took from his pocket a measuring tape, and giving one end of it to the young man who had been unloading the express wagon, he proceeded to measure a certain number of feet from the sidewalk, back into the lot, and then from one side of the lot, at right angles with the first measurement, and at the point where these two measurements met he drove a stake. "There!" said he, "there is our north-east corner. Does that look right?"

"Right, I should say," replied Mr. Merrill, walking to the stake, and surveying with his eye its relation to the lines on the side and the front.

In the same manner Mr. Stowe staked out the three other corners of the house, Max watching his preparations with great interest. It so happened that Max had left his wagon right over the spot where one of the stakes was to go, and he had to run and pull it quickly out of the way.

"Well, sir," said Mr. Stowe, "you've just saved your wagon from having my stake driven right down through the middle of it. I wish you could move that tree out of the way as easily as you have moved your wagon." Max looked and saw that the lines of the house included a large elm tree.

"Look, papa," he said "that tree is right in the way of the house!"

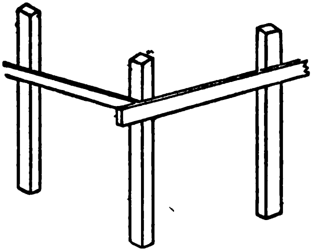
"Yes," said his father, "that tree will have to come down, and I'm sorry for it, for I don't like to cut down a tree."

"I don't like to, either," said Mr. Stowe, "when the root has to be dug up too. These elms have ugly roots. There is almost no end to them, and I expect it will be two or three days' work to get this one out of the way."

While Mr. Stowe had been saying this, he had been sharpening one of the pieces of board which had been thrown out of the wagon, with an axe, so as to make of it a long stake, and he now proceeded to drive this into the ground, near one of the smaller stakes previously driven. "The next thing," said he, as he did this, "is to fix our level. Let me see. I believe three feet was the height of the sill we decided on. That would be *there*." And with his pencil and rule he indicated the point on the stake, which was by this time firmly in its place.

Are n't you afraid that is a little too low?" asked Mr. Merrill.

"I don't know but it is," replied Mr. Stowe, Some conversation ensued upon this point, the result of which was a decision to raise the height of the sill six inches. Mr. Stowe then drove two other long stakes into the ground, each about three feet from the first stake, and each at the same distance from one of the two lines of the cellar as projected. He then connected these stakes at the top by means of two cross-pieces. The result was to make a sort of two-sided frame, like the illustration; the sides of which were parallel with the projected lines of the cellar that was to be. Then, directing his assistant to drive a similarly long stake at the next corner, he took his level, and applying it to the upper edge of one of the cross-pieces, showed where to fix the height from the ground, of the floor, at that corner.


A CORNER FRAME.

"Why does he not measure from the ground?" asked Max.

"Because," replied his father, "the ground is not even. Don't you see that it is lower over there than it is here? If he were to put the floor at precisely three feet and a half from the ground all round, it would slant and twist at a great rate."

When Mr. Stowe had fixed his frames at the four corners, thus, as it were, marking in the air the points of each corner of the floor of the house, as it was to stand, Mr. Merrill had the opportunity of showing Max the "level," as the instrument is called, and of explaining its use. Max found it to be a long, slender, and perfectly straight bar of heavy wood. On one face of it, just in the middle, was inserted what looked like a small, flat glass bottle, filled with water, leaving just one little bubble of air. "You see," said Mr. Merrill, "when I hold the level perfectly *level*, this little air-bubble remains just in the middle; but if I lift either end of it the merest trifle, the bubble moves that way."

Max looked, and was greatly interested in seeing the movements of the little bubble. It seemed sensitive to the slightest touch of the instrument.

"Why does it do so?" asked Max.

"Because," replied his father, "air is lighter than water, and will always rise above it; and the little bubble will always move toward that end of the glass which is higher. When it is exactly in the middle and stands still, Mr. Stowe knows that both ends of the upper face of his level are level, and running his eye along it, he can fix a point at any distance, exactly upon the same level. That is what is called 'sighting,' and if you will look at the four corner frames, you will see that though they are at different heights from the ground, they are on the same level;

and when the house is built according to these frames the floor will be level and even."

"In some respects," continued Mr. Merrill, "this is the most important part of the work of building a house. There is a saying, 'All's well that ends well,' and there might almost be this other, 'All's well that begins well.' It is at least true that 'what is well begun is half done,' and if Mr. Stowe should start the house upon false levels, it would be a bad piece of work before he got through. The floor would tip, the walls might lean, the joints would be imperfect, the various angles would be all awry, and, what is worse, the fault never could be cured. It is very easy in this life to go on right and come out well, if you *begin* right; but if you begin *wrong* you are sure to *go* wrong all the way, and can never get right at all. So, you see, we have learned one good lesson this morning while watching Mr. Stowe."

"I have often seen these frames," said Max, "in places where they were going to build a house, and I never knew what they were for."

"Well, you know now," said his father, "they are for two purposes. Can you tell me what two?"

"Yes," said Max, after a moment's thought. "They help to show the corners of the cellar, and they give the height and level of the floors."

"That is it, exactly," said his father. "I'm very glad you came up with me this morning. You have learned two lessons, one in mechanics and one in morals."

CHAPTER VII.

FOUNDATIONS.

UPON the following day work was fairly begun upon the house, and almost every morning as the summer wore on and the work progressed, Max went with his father to view the house. Mr. Stowe always had some questions to ask and Mr. Merrill commonly had some suggestions to make, and Max took great interest both in questions and suggestions, and in the various processes carried forward by the laborers and mechanics in succession.

The first step, of course, was the digging of the cellar. That took several days, the removal of the old elm tree being an awkward job, and occasioning considerable delay. The tree had first to be cut down, and a grand crash it made when it fell.

"I suppose this tree belongs to me," said Mr. Merrill, as he stood by the prostrate trunk, surveying its form and proportions.

"I guess it does," said Mr. Stowe, "and what will you have done with it. Chop it up for fire-wood?"

"No," said Mr. Merrill, apparently surveying its length and shape with his eye. "I think I will keep the greater part of it for another purpose. The branches and limbs can be trimmed off by and by, and for the present it can be rolled off out of your way."

"And this old stump," asked Mr. Stowe, about which the men were now digging, hacking away at its roots with their axes whenever one was discovered. "That's of no good, I suppose."

"I'm not so sure of that," said Mr. Merrill. "I think I shall want to use that too. At any rate when the men get it loose they may just roll it out over there on the grass by the trunk, and let it stay till I decide."

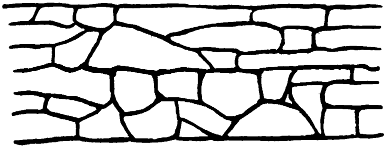
The loosening of the stump was a very difficult undertaking. It is a peculiarity of the elm that its roots are very numerous, very long, and very intricate. Above ground it is a beautiful tree, but below ground it monopolizes all the soil within its reach, and, the farmers say, kills their grass. If the reader has ever followed the banks of a river that winds through an intervale where the elm grows, he will often have noticed, at points where the spring freshets have worn away the soil, the long roots of distant elms which have been uncovered by the action of the water, and are left sticking out from the banks. In their living state these roots are almost as pliable as a rope. They are exceedingly porous, and only stiffen when they become perfectly dry. The elm likes plenty of water to drink, and its roots are its hands and fingers which it stretches out to the river and the moist places of the ground.

This peculiarity of growth had given the elm on Mr. Merrill's lot a tight hold upon its place.

"It *is* hard for you, is n't it, old fellow," said Mr. Merrill, half to himself and half to Max, as the two stood looking on while the laborers dug and cut away. "Here you have been living on this land these fifty years or more, and no wonder you think it belongs to you. No wonder you don't want to give up your tenantry to a stranger. I would n't want to if I were you. I'd hold on as tight and as long as I could, and go only when I had to. I'm sorry enough to part with you as it is. If you had only chosen a little different part of my lot to grow in, I would have let you stay and welcome as long as you lived. But you are right in the way of my cellar, and as you will not move yourself, the only thing to be done is to move you."

It took two men nearly two days to get the old stump out of its place. The earth had to be dug away all about it and under it, and the roots, big and little, cut as fast as they appeared, and then at last a team of horses was hitched to it by means of a strong chain, and with a prodigious effort it was jerked out of its hole, and hauled off upon the grass at one side, tumbling over and over as it went. Max said it was like pulling a great tooth. The cavity that was left was a good beginning towards the excavation of the cellar.

The latter work now went rapidly forward, and in a very few days the stone masons were able to begin. When Max reached the spot one morning he found a great pile of blue stones on the cellar floor, and a cart just arriving with more. Two men had made a beginning with the wall. Max found himself greatly interested in watching their operations. He noticed how careful they were to choose the flat and smooth surfaces of the stones for the inner face of the wall, and to *bind* the whole wall together as it grew, by covering each joint in each layer with a single stone in the layer above, very much in the manner in which bricks are laid.



A WALL WELL BOUND.

"You see," said his father, "it makes little difference how the outer face of the wall looks, for that will be all below ground after the work is finished and the grading has been done. But the inner face which is to be the side of the cellar, must be as smooth and even as possible, not only for the sake of appearances, but to avoid the accidents which might happen if we should run against sharp points of rock in the dark."

The masons really began the work of laying the cellar wall, before the cellar itself had been fully dug. The ground had to be left sloping at one side as long as possible, so that carts could drive down and up to carry away the soil; and as soon as the side opposite had been all dug away, as deep as was necessary, the wall along that side was laid. The walls upon the adjoining sides followed, and by the time they were finished, the excavation was complete, and ready for the wall upon the fourth and last side. When the digging had so far progressed that carts could no more be driven down and up, the laborers had to throw the gravel by hand over on the outside. This made quite a bank around the edge, which Mr. Merrill told Max would be just in place when the grading came to be done.

The foundation wall was laid partly in stone and partly in brick. The stone came up about to the level of the ground in its original condition. Then it was topped off with brick for the height of about three feet more, making in all about eight feet; which is a very good height for a cellar wall. At the proper places the bricklayers put in the frames for the cellar windows, which Mr. Stowe's carpenter had all ready for that purpose, and a gap was also left in the back side for the "bulk head," through which the outside stairs were to pass.

"Good!" exclaimed Mr. Merrill, when, one afternoon at the time of his usual visit, he found that the masons and bricklayers had gone; "the first part of our house is done."

CHAPTER VIII.

FRAMING.

THE next stage in the building of the house at Long Look was the framing. Framing is the process by which the various timbers, composing the skeleton of the wooden house, are fitted to each other and laid in their proper positions. For this reason such a house is often called a *frame* house in contradistinction from a house of bricks or stone. And there is a peculiar fitness in calling such a frame a *skeleton*. Timbers are to a house precisely what bones are to a body. Flesh without bones would have neither form nor strength; bones give it both. A house could not be built to good purpose of boards alone; there must be timbers outlining its shape and giving it support. And the endurance and comfort of a house depend very largely upon the character of the frame. If the timbers are too light the house is shaky, and trembles with every wind. If they are not thoroughly seasoned, then when the house comes to be occupied, they shrink and warp, and the plastering cracks in consequence. Moreover, as the timbers are covered all over within and without as soon as they are in place, defects in them are out of sight and out of mind, and it is a difficult and expensive work to remedy them. Therefore the framing of a house is a part of the work of the first importance, and one that very fully tests the judgment and fidelity of the builder.

No sooner had the digging of the cellar commenced than a beginning was made upon the frame. With the carts that brought the bricks and stones for the foundation, came great drays or wagons, drawn by several horses, and loaded with lumber of various sizes and kinds. There were heavy beams, and lighter beams, rough boards and planed boards, clapboards and laths. The clapboards and the laths were tied up in bundles of a size easily to be handled. The boards and timbers were loose, each by itself. Max was greatly interested on one occasion when he was present in watching the operation by which the heavier portion of the lumber was unloaded. He noticed, in the first place, that the bottom of the cart was not level, after the ordinary pattern, but steeply inclined. He noticed, in the next place, that above this inclined bottom were fixed large wooden rollers, and that the load of lumber did not rest directly on the bottom but on these rollers. When loaded, the lumber was held in its place by stout ropes passed back and forth around the end of the pile and on the top; but when these ropes were unloosed it required but a very little effort to start the whole sliding down the inclined plane, and the team moving off at the same moment, the lumber was all deposited in one stroke in good order on the ground.

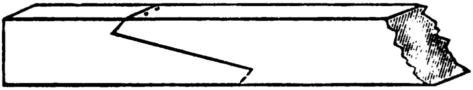
Several carpenters were ready to go to work at once upon the timbers, framing them together, and Max spent an hour one morning very happily, in watching their operations, and receiving explanations from his father about the various timbers, their relations to each other, and the ways of putting them together.

"Do you see," said Mr. Merrill to Max, "that there are several sizes of timbers, and different shapes?"

"Yes," said Max, "some are very large, and some are smaller."

"And some," added his father, "are square, while others are flat. All these differences are to suit their different purposes, and each timber has a name of its own. First, there are the *sills*, which are to rest on the brick work, and run across from side to side, forming the framework of the floor. Those longest beams, square and very heavy, are for the sills, I suppose."

Max looked in the direction in which his father pointed, and saw two of the carpenters doing a curious piece of work with two of the biggest timbers. They were splicing them. Neither one was fully long enough for the place where it was to go, and the difficulty was to be overcome in this way. The splice was made by cutting away one end of each timber in

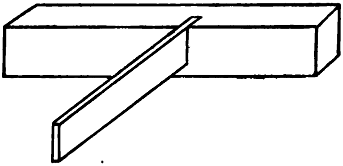


TIMBER SPLICE.

an irregular manner, and bringing the two ends together so as to lap over each other. The joint was then made secure by fastening it with stout, heavy pins.

"What are some of the other beams besides the sills?" asked Max.

"Well," said his father, "the next most important beams, perhaps, are the *posts*, for the corners; they are square, like the sills, and they have to be large and strong so as to give firmness and solidity to the building. Then there are the *plates*, which run along at the top to connect the posts and receive the rafters. Then there are the rafters, for the roof; and the small *studs*, to fill out the walls; and the floor beams. The floor beams, too, are very important, and they are so shaped as to be light, and yet stiff and unyielding. Those are the floor beams, I suppose;" so saying Mr. Merrill pointed to a pile of broad, thin timbers, which looked more like thick planks than like beams.



FLOOR BEAMS.

"Those don't look very stiff," said Max. "I should think they would bend a great deal more easily than if they were square."

"So they would," said his father, "if they were set *flat*. But they are set edgewise, and so their *width* becomes their *thickness*, and they are really very stiff and unyielding, indeed."

Another process which Max liked to watch as the framing went on was the making of mortises and tenons. When two timbers are to be joined together at some angle, it is done by means of a mortise and tenon. In one of the timbers a hole is cut out, of a suitable size and shape, called a *mortise*. Then a part of the end of the other timber is cut away, and so shaped as to fit exactly into this mortise. This is called a tenon. A large part of the work of framing a house consists in making these mortises and tenons. The sills all have to be mortised to receive the posts, the studs and the floor-beams; and there are braces and other timbers to be provided for in a similar way. All this work requires a great deal of careful calculation and measurement. The beams are shaped each to its purpose according to the plans, and each mortise must be in just the right place, and each tenon of just the right size; or else, when the time comes to put the frame together and raise it, the several parts will not fit. Max noticed that one of the carpenters took great pains in taking the preliminary measurements, to have them precise and accurate. He used a large iron square, divided off into feet and inches, and a pair of heavy iron compasses with sharp points. By means of the square he determined the position and size and shape of the several mortises or tenons, and then by means of his compass he marked out the outline. Then another carpenter followed with the proper tools to do the work. In the case of a tenon, he cut partly through the timber at the proper place with a saw, and then chipped off the superfluous wood with a chisel and mallet. In the case of a mortise, he bored two or three holes with a large augur inside the outline which had been marked, and then with his chisel cut away the rest, so as to make the straight-edged and right-angled socket which was required.

One of the carpenters had a curious machine for boring the holes, which seemed to save a great deal of labor. Max called it a machine-augur. It consisted of a heavy frame of wood, part flat and part upright, in which was fixed an augur, so arranged and connected with cogs, that by means of cranks, one on each side, the carpenter could bore a hole very quickly indeed. It looked like very pretty work.

"I wish I had such a borer as that, papa," said Max, as he stood by the machine and heard the sharp cut of the augur as it was driven through the wood, and watched the bright chips as they fell to the ground.

The work of framing advanced very rapidly, and it was not many days after the cellar wall had been finished, before the growing piles of finished timber indicated that the frame was nearly ready to go up. The sills and floor beams were in fact already fitted together in their place and boarded over, making a broad and solid platform, covering the whole cellar.

"Now," said Mr. Merrill, to Max, as they were turning away one morning, after having spent an hour in watching the work, "if we could only have an old fashioned raising."

"What is that?" asked Max.

"Why, when I was a boy," responded his father, "the frame of a new building was always put together upon the ground, that is a part of it at a time, one of the side walls for instance, and then raised all at once. It required a prodigious effort to do it, and a great many men. So when there was to be a raising, the builder sent word to his neighbors, or if it was out in the country, to all the farmers around, and as many as could would come over and help him. They generally made an afternoon of it, and ended off with a 'treat,' or a supper, or some such thing. It used to be pretty exciting sometimes, when they got a great piece of framework raised away up in the air nearly to its place, and hadn't quite strength enough to carry it further."

"And why don't they have raisings now?" asked Max.

"I don't know," replied his father, "unless they have found that such a hard job isn't really necessary. Now, I think, they raise the frame little by little, piece by piece. In fact they don't really raise it at all. They build it in the air, timber by timber."

And so Max found it to be. A morning or two after this conversation, when he and his father paid their usual visit to the scene, this work had fairly begun. Two of the corner posts were in place, and the plate had been laid across at the top, while at one corner, so high up that Max said he should think he would be afraid of falling, one of the workmen was adjusting a tenon to its mortise, and driving in a stout wooden pin to hold it, by means of a broad-axe. From this point the work of framing and boarding went rapidly forward, and before many days Max had the great satisfaction of seeing the structure all covered in, and beginning to assume much of the aspect of the house that was to be.

CHAPTER IX.

A DAY ON THE GROUND.

ONE morning as Mr. Merrill and Max turned to leave the house, after having spent an hour in watching some operations of peculiar interest, Max said to his father: "Papa, I wish you'd let me stay up here some day, all day, and then you come for me at evening."

"Should you be willing to do that?" asked his father.

"Why, yes, I'm sure I should. Mr. Stowe would take care of me."

"Yes, indeed," said Mr. Stowe, who had overheard the conversation, "that I would very gladly, and I guess it wouldn't be very hard work, either; you don't look like a hard boy to manage. Some boys I should n't like to have round,—they are forever asking questions and meddling with the tools, and getting in the way. But I guess you are not that kind of a boy."

Max looked pleased at hearing this declaration of his good character, and his father added: "That is all in your favor, and if you and Mr. Stowe alone were concerned, I don't know that I should make any objection. But your mother would have to be a party to any such contract as this, and I think you must wait and ask her. Besides, what would you do for dinner?"

"Oh!" said Max, "I could bring my dinner in my little pail, just like the men. They bring their dinners you know."

"Well," said his father, "we will see about it." And 'see about it' they did, as soon as evening came, and they were all together around the tea-table. Mrs. Merrill was rather startled at the proposition at first, for the thought of this small boy spending a day in this way, a mile from the house, among strange men, and sharp tools, and heavy beams, and piles of boards and bricks, and all sorts of difficulties and dangers, struck her very unfavorably. But she was a sensible woman, as well as a care-taking mother, and the more she thought of the plan the more she saw that a day so spent, extraordinary accidents excepted, could bring no harm, and that it might have a useful influence in many ways upon Max.

Accordingly, in the end she gave her consent; and, the weather being fair, Max chose the very next day to carry his plan into effect. His mother put him up a nice luncheon in a little tin pail, consisting of a chicken sandwich, a bun, an apple, and a paper horn of nuts and raisins. And after breakfast off he started in his little wagon, with his father, in high spirits. It must be owned that when his father had finished attending to such things as awaited his notice at the new house, and was ready to leave Max and return to the city, the little fellow's heart fluttered a moment within him, and his resolution wavered. But he was in for it, and he felt too much of a man to back out, so he screwed up his lips and took a big swallow and said "good-bye" with a cheery voice, and watched his father till he took the horse-car and disappeared. For a few moments, as a sense of his situation came over him, his heart sank within him; but soon some new movement of the carpenters attracted his attention, and it was not long before he was running about, almost as much at home as if he were in his own yard, under his mother's eye.

The morning passed very rapidly away. He was in the house and out of it, running here and there about the littered and crowded yard, watching such chance teams as drove by, and now and then attempting some building operations on his own account, with a pile of rough blocks which had been gathered at one side; but always taking care to keep out of the way of the workmen, not touching anything which he did not feel perfectly sure it was right for him to touch, and if he asked any questions, asking them in a polite and respectful manner. Almost before he knew it the clock on a neighboring steeple struck the hour of twelve, and the men, laying down their tools and taking off their aprons, gathered in various places about the premises to eat their dinners. Max followed suit, and establishing himself upon a great block, under a shady tree, opened his pail, too. He had barely begun his sandwich, when he heard approaching footsteps, and looking up, saw his mother and his two little sisters approaching. They had come to pay him a visit.

Max was overjoyed at the sight, and laying down his sandwich, jumped up and ran to meet them.

"Why, you dear mamma!" he exclaimed, "how good you were to come up and see me—and to bring Jenny, too, and little Maud." And he gave Jenny a kiss, and Maud a hug, by way of welcome.

"We've brought our luncheon, too," said Mrs. Merrill, holding out the basket she carried in her hand. "Can we sit down and eat ours with you?"

"Oh yes!" said Max eagerly, "here's a nice place," and he led the way to the shady seat under the tree. Three more blocks were quickly brought, and then, discarding one of these, a board was dragged from a pile near by, and out of the board and two of the blocks, Max fashioned quite an excellent bench, for his mother and sisters to sit upon.

"And how has my little boy got along this morning, away from his mother, all alone by himself?" asked Mrs. Merrill, looking down with a pleasant expression, into Max's face.

"Oh, pretty well," said Max.

"Were n't you lonesome when papa went away?"

"H'm, no; not much," was the reply.

"Did you cry?" asked Jenny, looking at her brother with an evident sense of increased respect.

"No, indeed," said Max, with a shade of indignant contempt in his voice. "What was there to cry

"WE'VE BROUGHT OUR LUNCHEON, TOO."

about? The men were all here, and I [illegible] wagon and my lunch. Aren't the men getting along fast, mamma?" he asked, changing the subject.

"Yes," said his mother; "very fast. It looks as if it was almost ready for us to live in now."

"Oh no, mother, not yet," said Max. "The plastering is not done, and the windows are not in. The carpenters have only just begun. It won't be done for a long time."

In this way, talking and lunching, the hour of noon wore away, but before it was fully gone, Max had to take his pail and go over to the nearest house after some water. The servant who came to the door not only filled his pail with water, but she put a good big piece of ice in it, too.

"I guess you're the little boy that's going to live in the new house," she said, as she handed him back his pail.

Max was very eager to have his mother and his sisters go into the new house, and the little girls were as eager as he; but Mrs. Merrill thought it was hardly best.

"There are a good many of us," she said, "and the men will be busy at their work. I am afraid we should be in the way. I guess we had better not go in. We only came up to stay a little while with you."

Mrs. Merrill proposed to Max that he should go back with her and the children, but Max did not look upon this plan with any favor at all.

"Oh, no, mamma," he said. "I'm not tired. [illegible] Mr. Stowe wants me to help him, too. And, besides

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"Oh, no, mamma," he said, "I'm not tired, a bit. Mr. Stowe wants me to help him, too. And, besides, papa is coming up for me, you know, between four and five, and he would be disappointed if I were n't here."

So it was decided that Max should stay, and presently his mother and sisters, bidding him good-bye, took their departure.

Max spent the afternoon, as he had the morning, in a very happy way. Now and then Mr. Stowe gave him some bit of a job to perform, which helped him to feel that he was of some importance, and at other times he found plenty to do watching the men, or digging in the sand that still remained heaped up around, or raking up some of the chips and shavings that were scattered about. Max had quite an idea, for a small boy, of being useful. He liked to take his play in ways that would please his father and mother; and he very justly reasoned that if he did some little good this time there was more likelihood of his being allowed to spend another day in the same way.

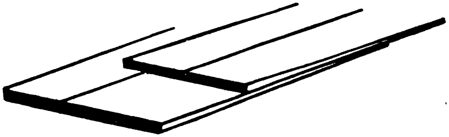
When his father came, at a little after four, he found that Max had really done a good deal of clearing up, and he was greatly gratified thereby. He told Max that that was the kind of boy he liked to see, and if he was going to improve his privileges in that fashion, the more privileges he had the better. The result was that after this Max was allowed to spend a day very frequently at the new house, and thus was enabled to watch almost all the building of it, very much to his instruction and pleasure.

CHAPTER X.

SLATES AND SLATING.

ONE of the important and interesting questions which had to be discussed and decided in the course of the building of the house at Long Look, was that of covering the roof. There are three materials now commonly in use for that purpose. One is tin. Large square sheets of tin are laid, edge to edge, all over the roof, and then the roofer with his solder and soldering-iron joins the seams, and makes of the whole one continuous sheet. This is finally painted over. It makes an excellent roofing, though an expensive one. It is especially used on flat roofs, or such as are nearly flat, where the rain-water runs off slowly, and would soak up under the cracks and joints of shingles and slates. There was only one place on the Long Look house where a tinned roof was used. That was over a bay window in the parlor. Max found that by going up stairs to the chamber window overhead, he could get very near the roofer, and have an excellent view of the process. The roofer had by his side a little charcoal furnace, made of sheet iron, in which he heated his soldering irons. He had two irons. One was always heating while he was using the other. It was very curious indeed, to watch the effect when the roofer brought the point of the hot iron and the bar of solder together, over the seams of the plates upon the roof. The lead of the solder instantly melted and ran down along the seam, just as the roofer's hand guided it, which he did in a very skilful manner. The solder cooled as instantly as it had melted, and there was something almost mysterious in the way in which, at the touch of the soldering iron, it melted itself from a solid mass into a semi-liquid, and then back again into a solid.

Another way of covering roofs is to shingle them. Shingles are very thin boards, about fifteen inches long, and varying from three or four to six and eight inches wide. They are cut generally from cedar logs, and are always a little thinner at one end than the other. They are laid upon the roof in rows, side by side, beginning at the eaves, each upper row lapping over a little upon the lower. It is quite easy and pretty work to shingle a roof.



SHINGLES.

Slates, which constitute the third kind of covering for roofs, are nothing more nor less than stone shingles, applied in much the same way; only they are of the same thickness at both ends.

"Are you going to shingle our roof?" asked Max of Mr. Stowe, one day soon after the frame was up and boarded in.

"No, sir," said Mr. Stowe, emphatically. "We are going to slate it. Don't you see the slates over there?" and he pointed to the back side of the yard, where a long row of slates was piled against the fence, and covered with a board in such a way that they had escaped Max's attention before. "I expect the slaters will come to-morrow."

Max and Mr. Stowe, let me here repeat, continued to get along very nicely together. Max was always respectful in his manner, and took pains to keep out of the way, not to meddle with the tools and lumber, and not to ask questions of Mr. Stowe or any of his men at such times as they were perplexed or particularly busy. Accordingly, Mr. Stowe rather liked to have him about than otherwise, and answered all such questions as he asked in a very accommodating way. Boys must learn, he said, and how shall they unless we tell them the things they want to know.

On seeing the pile of slates, Max bounded off to look at them. He found them to be thin, square sheets of bluish stone, looking very much like a drawing slate without the frame. They were piled up on their edges side by side, and there appeared to be a great many of them. He began to count them but soon got tired.

"How do you fasten slates on the roof?" asked Max, returning to Mr. Stowe.

"Nail 'em," was the reply.

"Can you nail through those slates?" exclaimed Max, in a surprised and incredulous tone.

"Oh yes," replied Mr. Stowe. "Did n't you see the holes?"

"No," said Max, and in a moment he ran back to the pile of slates to examine the holes. Sure enough, he found that in each slate there were two holes, near one end, one at each side, of just about the right size to admit the passage of a nail.

"How do they make those holes in such hard stones?" asked Max, when he had returned to where Mr. Stowe was working.

"Punch 'em," was the reply. "Besides, slate isn't very hard."

"Where do slates come from?" asked Max, after a few moments' pause.

"Oh, various parts of the world. Some come from Wales and some from Pennsylvania. These came from Franklin."

"What, Franklin right over there?" asked Max, pointing in the direction of a town which lay two or three miles to the northward.

"Yes," said Mr. Stowe, "Franklin right over there. There's quite a quarry at Franklin, and it's very good slate, too."

"But how do they get such thin, smooth slates?" persisted Max.

"Split 'em," said Mr. Stowe, who, if he always answered Max's questions, sometimes did not answer them very fully.

Max did not ask any more questions, but he spent some time in conjecturing how it could be possible to get stony slates into such convenient shapes, and he determined that when his father came that afternoon he would get some more information on this subject from him. Accordingly, when his father did come, about four o'clock, one of Max's first questions was:

"Papa, how do they get the slates for the roof so thin and smooth? I never saw such thin pieces of stone before."

"They split them," replied Mr. Merrill, "out of great blocks of stone. But you are mistaken when you say you never saw such thin pieces of stone before. What do you draw upon at home?"

"Paper," said Max.

"No," said his father, "I don't mean paper, I mean a black something, with a wooden frame around it."

"*My slate?*" exclaimed Max inquiringly, in a tone of surprise, as if a sudden thought had struck him.

"Exactly," continued his father. "Your slate is the same stone with those roofing slates, only it is of a particularly fine quality. The rougher kinds do for roofs, but they are all slate."

"Mr. Stowe says they came from Franklin," added Max.

"Yes," said his father, "there is quite a quarry over at Franklin, and it is a very good slate."

"Do they dig it out?" asked Max.

"Yes," said his father, "they blast it out first, and then split it up. It is a very curious operation."

"I wish you would take us over there, some time."

"I will," said his father. "We might go over there tomorrow. I was going to stay out half a day tomorrow, and take you and your mamma and the little girls to ride.

"Oh, I wish you would," said Max, "I should like to see that quarry so much. But why do you slate the roof, instead of shingling it?" he presently continued.

"For various reasons," replied his father. "That is one of the questions that has to be determined a good deal by what we call *local* considerations. If we were building this house away back in the country, among the woods and saw-mills, and at a great distance from any slate quarry, it would be cheaper, and perhaps better, to use shingles. But here, at a distance from all woods and saw-mills, and close to an excellent slate quarry, it seems better, and is about as cheap, to use slates. These slates are safer to cover a roof with in a closely built up town like ours. When a fire breaks out, shingled roofs are exposed to great danger. The burning cinders, blown by the wind, often drop upon roofs near by and set the shingles on fire, particularly if it is a dry time. But slates, of course, are a complete protection. Then there is another reason in favor of slates: they don't wear out. Shingles decay, and after a time they have to be renewed, but good slates, well put on, will last a great while; as long, probably, as we shall."

CHAPTER XI.

THE SLATE QUARRY.

THE next morning proved to be a very fine one, and Mr. Merrill put the project of a ride into execution. Greatly, too, to Max's satisfaction, he adhered to his plan of paying a visit to the Franklin slate quarry. About nine o'clock the man from the livery stable came with the horse and carryall. The carryall was a large and roomy one. Mrs. Merrill, Jenny and Maud sat on the back seat, and Mr. Merrill and Max on the front seat; but the curtains were up both at the back and sides, so that all had equally good views. The day was very pleasant, the air being soft and balmy, and the foliage and grass fresh and green.

The ride to Franklin was not a long one. The party drove first to Long Look, and Mr. Merrill stopped in the street in front of the house for a few minutes, so that all could see how well the work was going on. The slaters had begun upon the roof, and already there was a narrow border of dark blue along on the edge of the bright new boards. The various workmen were all very busy, and the sound of sawings and poundings filled the air.

After leaving Long Look, the road led along the bank of the river for a little distance, and then, crossing it by a pretty, covered bridge, began the ascent of a hill that lay beyond. In the course of about half an hour, after various windings and turnings, the carriage arrived at a point where Mr. Merrill, pointing to a place on the hillside at a little distance, said to Max:

"Do you see the quarry? there it is."

Max looked in the direction in which his father pointed, and saw signs of some unusual work in what appeared to be a pasture near the edge of the woods that crowned the hill. There were two great heaps of bluish rocks, each almost a hill in itself, one or two rough board buildings, and two immense masts rising in the air, supported by what appeared to be ropes extending from the top to the ground at various points around.

"Is that the quarry?" asked Max, studying the object very attentively.

"Yes," said his father.

"What are those masts?"

"They are the derricks, for hoisting out the slate."

"And are those the slates, those great heaps of stones?"

"No, that is the refuse rock that has to be got out of the quarry before the real slate is reached. The real slate," continued his father, "lies buried up under masses of a slaty kind of rock, and a great part of the work of quarrying consists of getting that worthless rock out of the way, and getting at the good slate underneath."

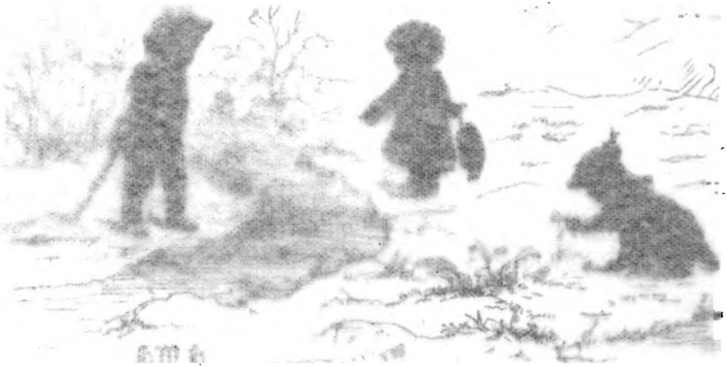
"And how can they tell that there is any slate there?" asked Mrs. Merrill, who was looking at the quarry as attentively as Max.

"There are certain signs of its presence," replied Mr. Merrill, "which are plain enough to those who make it their business to study them. The man who owned this land was something of a geologist himself, I believe, and he knew about the different kinds of rock, and the laws which govern their formation and disposal. He was out here in his pasture, one day, and he happened to strike his foot against something. Looking down he found the sharp edge of what appeared to be a ledge of slaty rock, just cutting through the turf. His curiosity was at once excited, and he made an examination of the ledge. I believe he sent away some specimens, and afterwards got a man to come and see it — a man who had worked in slate quarries and knew all about them. At last he found that he really was the owner of a large and valuable bed of slate. And this is the result. But before he got at the real slate, an immense amount of earth and rock had to be dug away, and that is what you see piled up all about the quarry."

By this time the carryall had reached a point in the road opposite the field where the quarry was situated. Max pointed to a pair of bars through which he thought they might easily drive into the field, and so ride right on up to the very quarry itself. But his father thought that would not be best. The ground looked very uneven, and there was no place in sight where the horse could well be tied. So they concluded to drive in by the side of the road, alight there, tie the horse to the fence, and then walk on the rest of the way. Jenny said she should like that a great deal better than to drive in. She would be afraid to ride over such rough ground.

While Mr. Merrill fastened the horse, Max let down the bars for his mother to get by, and then, carefully replacing them, the whole party proceeded across the field towards the quarry. The field seemed to be a pasture. At a little distance several cows were grazing. They lifted up their heads for a moment to see who was coming. At one place, in a little hollow fringed with bushes, was a spring, from which a rivulet trickled slowly down into the valley. Maud said she guessed that was where the cows went to drink. There was a rough kind of a cart-path all overgrown with grass, which afforded an easy and pleasant path to the party, avoiding all the great inequalities and large stones, and leading by a gentle circuit up to and around the piles of rock, and so at last to the very edge of the quarry.

Here a very strange and interesting scene presented itself. An immense excavation had been made in the side of the hill, perhaps twenty-five feet deep and a hundred and fifty feet across. The earth and rock which had been taken out had been dumped outside, forming an immense embankment all around. This was the mass of rock which had been seen at such a distance. A wooden track was laid on the top of it, on which a rude car ran back and forth to carry the



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"WHERE THE COWS WENT TO DRINK."

refuse to the outer edge of the heap. One face of the excavation was nearly perpendicular. The other was sloping. The bottom was filled with broken pieces of rock and pools of water. Near the lower part of the sloping side several men were at work with crowbars, prying off sheets of slate. There had just been a blast, and a considerable section of the ledge had been thoroughly loosened. Some of the men would pry off loose pieces of the rock, which would slide down with a tremendous noise to the bottom. Other men would roll and tumble these pieces into a huge crate or car that was waiting to receive them. When it was full they would fasten it to a chain which had been let down by the derrick, and then it was hoisted slowly up to the top and emptied there. There were two crates in constant service. While one was being hoisted and emptied the other was being filled, and when the emptied one was being let down to the bottom of the quarry again the other was filled and ready to take its turn.

These operations were performed by means of the derrick in a very easy manner. The derrick consisted of a heavy upright mast, the lower end of which fitted into a socket in the ground near the edge of the quarry, so that it could turn round and round. The mast was held in its position by long ropes, or guys, which passed from its top to the ground on the several sides. Near the bottom of the mast a long arm projected from it so as to hang way over the pit, and through a pulley in the end of this arm ran a rope down to the bottom of the pit. The other end of the rope was wound around a huge windlass, near the foot of the mast. This windlass was turned by a horse, who was harnessed to a curious kind of lever connected with the windlass. At the proper signal from his driver the horse would begin to walk round and round in a great circle, pulling the end of the arm behind him. This acted in turn upon the windlass, and began to wind up the rope which passed along the arm of the derrick down into the quarry, where the end of it had been hooked into one of the crates laden with slate. By this the crate was slowly lifted up to the level of the ground, and a little higher. Then by means of another rope a man swung it laboriously over and beyond the edge of the quarry to the place where its contents were to be emptied out. Then it was swung back again, and the horse having been detached, it began to descend quickly to the bottom of the quarry by its own weight, the windlass turning round very fast indeed. By the time the empty crate reached the bottom, the other crate, which the men had been filling, was ready to take its place, and the whole operation was repeated. The children and their father and mother stood watching it several times over.

As soon as the stone was dumped out of the crate two men began to split the blocks up into sheets. Such pieces as would not properly split, or were broken in the process, were thrown aside, and a man wheeled them off in a wheelbarrow to make a part of the great pile of refuse which was slowly extending all around the mouth of the quarry. As fast as good slabs were ready they were carried into a little house or shed near by, and when Max and his father had finished watching the operations outside, they followed in to see what was done here.

"I expect they *dress* the slates in here," said Mr. Merrill.

"Do they call it *dressing* them?" asked Max.

"Yes," said his father, "reducing them to just the right thinness, squaring them and then punching the nail holes."

In the shed they found the dressers hard at work. The workmen were seated at a curious little bench, and used as their tool a sort of chopping knife, on the back of which was a sharp point. The workman took from the ground at his side a piece of slate, trimmed its edges and corners, leaving it as large as the shape of the rough material would allow, and then with the sharp point of his instrument made the nail holes. The entire operation was done in a moment, in less time, almost, than it has taken to tell about it, and the dressing of the slates seemed about as easy work as cutting slices of cheese. The slates came out of the dressing process, of course, of different sizes, and were sorted accordingly in different piles. Some were square, and some were oblong; some were small, and some were large; but all looked very neat and trim, and the piles grew very rapidly.

"All this work of dressing," said Mr. Merrill to Max, "which you see here done by hand, is done in large quarries, I believe, by machines."

"I should like to go to one of those large quarries and see the machines," said Max.

"Yes," said his father, "so should I, very much indeed."

The party spent an hour at the quarry in a very pleasant way. Just as they were on the point of returning to the carriage, and as Max was asking his father how the workmen got down into the quarry and up again, they saw a man jump into the crate after it was emptied, and allow himself to be swung over and lowered down.

"That's the way!" said Mr. Merrill. "Do you see?"

"Yes," said Max, "and I think it's a very easy way indeed."

CHAPTER XII.

MORTAR AND PLASTERING.

THE roof of the new house was one of the first things finished. The masons had made a beginning with the chimneys as soon as the foundation was fairly in, and they carried up their brick-work almost as fast as the carpenters their timbers, so that by the time the rafters were in place and boarded over, the chimneys were peeping out of the apertures which had been left for them, and in a very little time after received their caps and were ready for service. The slaters accordingly could go right on with their work while the carpenters were still busy below.

"You see," said Mr. Merrill, one morning, as he and Max stood in the yard, taking a last look before they went away, "it is very important to have the house covered in snug on the outside as soon as possible, the roof especially. With a leaky roof no work could be done inside to advantage; if it should rain the men would get wet, their tools would be spoiled, and the work itself would be greatly hindered, if not actually injured. But with a tight roof overhead, everything else proceeds smoothly and prosperously."

"What is the next thing they will do?" asked Max.

"One of the next things," replied his father, "will be the plastering. Come, I will tell you about it as we go along home."

So saying, they turned their backs upon the new house, and set off round the corner and down the street.

"The wall of a house has to be made very thick," continued Mr. Merrill, "at least it ought to be, in order to be warm. Can you think and tell me how many thicknesses of materials there are to the wall of a wooden house?"

"The boards," answered Max.

"That's one," rejoined his father.

"And the clapboards."

"That's two."

"And the plastering."

"Three."

"And the paper."

"Four."

"And the paint outside."

"Yes," resumed Mr. Merrill, "there are five. Two of them, the paint and the paper—if the inside walls are papered—are very thin, but they help to contribute to the tightness and warmth of the wall. And I am going to have two more thicknesses still."

"Two more?" asked Max. "How? What are they to be?"

"Paper under the clapboards," replied his father, "and back plastering."

"Paper under the clapboards?" asked Max, again, in a tone of some surprise. "What's the good of that?"

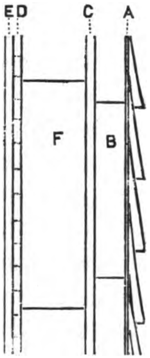
"I don't mean a common thin paper, like that with which walls are papered; but a thick, heavy paper. There is a kind which comes expressly for the purpose—there are two kinds, in fact. I think such a lining will help greatly to cover over the cracks in the boards, and so keep the house warm in winter."

"And what is the back-plastering?" asked Max.

"Plastering behind the regular plaster wall, against the inside of the outer boards. Do you remember the small, upright timbers that ran from the sills to the plates, standing very close together, on which the outer boards were nailed?"

"Yes," replied Max.

"Well, where the surface of these boards between the studs is plastered, it is called *back*-plastering. After the back-plastering has been done, then the laths are nailed on to the studs, and what we may call the *front*-plastering is put on—the plastering that we see."



[*] SECTION OF WALL.

"What are laths?" asked Max.

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[*] A, layer of paper.
B, outer boards.
C, back-plastering.
D, lathing.
E, front plastering.
F, open space.

"Thin strips of wood nailed side by side, with a little crack between them, all around the walls and across the ceiling. The plaster would n't stick against a flat, smooth surface. But when it is spread over the laths, some of it gets squeezed through the cracks, and when it hardens it holds in place. You will see how when they come to plaster."

"And how do they make plaster?" asked Max.

"Very much as they make mortar," replied his father. "Do you remember the mortar with which the masons laid the bricks for the foundation?"

"Oh yes," said Max. "They made that out of sand and lime and water."

"Well," continued his father, "when they make mortar for plastering they put cow's hair in it, that is, in the coarse mortar which is used for the rough under-coat of plaster. There are always two coats of plaster, a rough coat which goes on first next the laths, and a smoother, finer, nicer coat which goes on afterward. This last coat is called the *skim*-coat. I think they don't put any hair in that; I suppose it would show and look badly. But it does n't show in the under plaster and it makes it hold together better."

When, a day or two after this conversation, Max visited the house again, he found the back-plastering all done, and the lathers busy nailing on the laths. They nailed them very fast indeed. It was only a short time before the whole house was lathed. And then the plastering proper began. This work it was not very easy to watch near at hand. The rooms were filled with staging, and the soft, wet mortar kept dropping from the plasterer's tools until the floor was covered with great blotches of it in every direction. When the rough coat was all on, the windows were closed by means of white cloth. Mr. Stowe told Max that this was to keep the plastering from drying too fast.

"When it dries too fast," said he, "it cracks, and in such weather as this, with the warm air circulating freely about through the doors and windows, it would dry very fast indeed, and spoil the job."

When the plasterers came to their *skim* coat, as the second and finishing coat is called, the work seemed rather neater, and Max could watch it more easily. He was very much interested in seeing with what skill the plasterer applied the mortar to the wall, and how dexterously he spread it out thin and smooth, so as completely to cover the rough coat and leave a perfectly even surface. The plaster for the skim coat seemed to be of a different color from the other. It was white, and every way finer and nicer looking. And when it had been carefully laid on, it made a very handsome wall indeed.

When thus watching the men at their work, Max always took a great deal of pains not to get in their way, and not to bother them by asking too many questions. Some of the men were rather silent, and little inclined to talk, hardly even to speak when they were spoken to. Others were more sociable, and seemed to take an interest in Max, and to like to have him around. Among them was a young man who went by the name of Andy. His name was Andrew, but the other men always called him Andy.

He was a smart, spry young fellow. He took quite a fancy to Max, and Max to him as well, and they got along quite nicely together. Max felt quite free to go to Andy for almost anything. He did not know, what was the fact, that his father, finding how much time his little boy was likely to spend at the new house, had gone to Mr. Stowe and asked him if he would not let Andy have a special care of him.

"I expect it will interrupt him a good deal in his work," said Mr. Merrill, "but we will make account of that when we come to settle. Such a boy is usually more or less trouble, and yet I am glad to have him here, under these circumstances, for it is a kind of school for him."

Mr. Stowe said it would be all right. He had no doubt that Andy would be very glad to have special care of Max, and he would speak to him quietly about it. So Mr. Stowe told Andy what Mr. Merrill's wishes were, and Andy said he would have it in mind. This explains the effort Andy made at times to keep Max busily and happily employed.

One time when the plastering was going on, Andy asked Max how he should like to do some plastering himself. Max laughed, and did not seem to know exactly what to say.

"I can fix it for you just as well as not," said Andy. "I can give you some laths and get you some mortar, and you can make yourself a wall, just as nice as you please."

"But where shall I nail the laths," asked Max.

"Oh," said Andy, "that's easy enough; nail 'em

AN AMATEUR PLASTERER.

up against the fence over there. Or I'll put a couple of studs in the ground, and some furring across, and you can lath that in regular style."

"No," said Max, warming up to the plan, "I'll do it all myself, if you'll give me the things. I don't want you to help me at all." So Andy hunted up for him two short pieces of studding that had been thrown aside from the house, and an armful of discarded laths, and gave him a hammer and some nails. "When you are ready for your mortar," said he, "let me know."

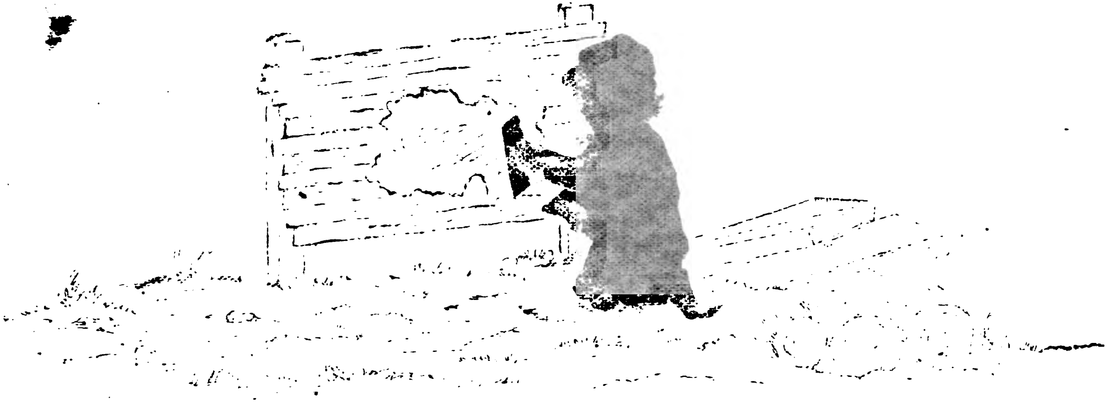
With these materials Max went to work in great eagerness. He first dug two holes in the ground about two feet apart. In these he planted his studs so that they should stand upright, stamping the earth in all around them hard and firm. Then he nailed his laths across, taking care to separate them a little, just as he had seen the lathers do in the house. He did not get them very straight and even, it is true, but still, for so young a mechanic, he made a very respectable job, and when it was finished looked upon it with a great deal of satisfaction.

"There," said he, "now I am ready for my plaster." And off he went to tell Andy.

Andy, according to his promise, left the work he was engaged on at the moment and went after the plaster. Pretty soon he returned bringing a large square piece of board with a great batch of mortar upon it.

"What do you call that thing they spread the plaster with?" asked Max.

"Trowel," said Andy.



AN AMATEUR PLASTERER

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"There," said he; "now I am ready for my plaster." And off he went to tell Andy.

Andy, according to his promise, left the work he was engaged on at the moment and went after the plaster. Pretty soon he returned bringing a large, square piece of board with a great batch of mortar upon it.

"What do you call that thing they spread the plaster with?" asked Max.

"Trowel," said Andy.

"Well, I have n't any trowel, and how can I spread my mortar?"

"What do you call *that?*" said Andy, and going to his bench he took from the shelf at the end of it, a little wooden trowel which he had just made. He had taken a thin, smooth bit of board and nailed a handle to it in the right place. Though roughly and quickly made, it was quite a respectable trowel.

"Thank you," said Max, taking it with a look of pleasure.

Max then went to work with a very business-like air. With a narrow piece of shingle he loaded his trowel, and then he spread the mortar out as well as he could over the surface of his laths, looking every moment at the other side to see it squeeze through the cracks. Now and then he dropped some on the ground, but when he had got the face of his wall all plastered, he found he had so much mortar left that he determined to plaster the other side too. So he plastered it all over, within and without, and he really did it very nicely indeed. Just as he was finishing up the job, Mr. Stowe came up to see what he was doing.

"What!" said he, "turned plasterer, already? But you've plastered your laths on both sides. They never do that."

"Oh, that's the back-plastering," said Max.

Mr. Stowe laughed, and went away.

Max's plastering turned out very well, except that it dried too quickly, as indeed it could not be kept from doing. The next time he came up to the house, it was all dried, both sides, as hard as a bone. But there were great cracks in it running in every direction. Max kept the wall standing, however, for a long time, and when his mother and sisters came to see it, they were quite pleased to see how well it was done.

"Can't Max plaster nicely?" said Jenny, who was very proud of every achievment of her brother. "But, Max, didn't you get your hands all mortary?"

CHAPTER XIII.

LIGHTING BY GAS.

BEFORE a beginning was made upon the plastering of the new house at Long Look, the pipes had to be laid for lighting it by gas, and as some of the readers of this book may live in the country, where gas is not used for purposes of illumination, I will take the opportunity, in this chapter, to explain the system.

In the main there are three kinds, or classes, of illuminating agents, used for household purposes — candles, oils, and gas. Of old, candles and whale oil were most commonly used; but of late years, kerosene oil has, to a large extent, taken the place of both of these substances, except in cities and large towns, where gas is used. The gas which is used for illuminating purposes is a product of coal. It is obtained by subjecting the coal to an intense heat in a kind of furnace. The gas, having been drawn out of the coal, is purified by a long and somewhat intricate process, and then collected in a huge reservoir, called a gasometer. From this gasometer it is distributed in pipes, laid under ground, through the streets, to the houses and other buildings where it is to be used. The manufacture of gas is too expensive to be carried on ordinarily by each family for itself; but when a great many families and stores and shops are crowded together, as in a large town or city, it becomes worth while for a company of men to manufacture the gas, just as other commodities are manufactured, and to supply it to those who want it at a fair price.

There are five parts to the apparatus by which gas, after its manufacture, is supplied to the *consumers*, as the people who use it are called. There are first the *mains*. These are large pipes, which are laid along in the streets, in deep trenches dug for the purpose. These may be compared to the *water mains*, precisely similar, only much larger pipes, by which water is conveyed about a city. These mains are always laid by the company which makes and sells the gas. Second, there are the house pipes, which are laid through a building to convey the gas to its several rooms. These pipes are always put in at the expense of the owner of the building. Third, there are the *service pipes*, which are branch pipes, one for each house, connecting the house pipes with the main in the street. The service pipes are put in by the gas company, but at the cost of the owner of the house. Fourth, there are the *fixtures* in the different rooms, by means of which the gas is so burned as to give light. These too, are put in by the owner of the house. Fifth, there are the *meters*, which are very curious machines for measuring the amount of gas consumed. These are furnished by the gas company, one for every house, sometimes several for the same house, when there are several different families in it. When this system is all perfect, and in operation, the gas company makes the gas at its works. The gas flows through the main, into the service pipes, and is measured by the meter as it passes through it into the house pipes, and so to the various fixtures.

Gas fixtures are of a very great variety of shape and size and style, but the principle is the same in all. There must be a tip at the end called the *burner*, with a very small hole in it for the escape of the gas, and a little stop-cock within it by which to shut the gas off or turn it on as needed. This stop-cock, which is turned by a little thumb screw on the outside of the pipe, works precisely like a faucet in a water pipe. The gas flows through the one pipe just as the water through the other pipe. You cannot see the gas, but you can smell it, and when it is escaping from the burner without having been lighted, it makes a slight hissing noise, which can very easily be heard.

There are many advantages in the use of gas for lighting houses and buildings of all kinds. In the first place it is very convenient. There is nothing to be carried about in your hand like a lamp, but a fixture is ready in every room to be lighted on the instant. Then it is absolutely clean. There are no spillings and drippings and spots, as in the case of lamps and candles. And it gives an excellent light, clear, strong and steady. On the other hand it is very much more expensive than other kinds of lights, and in careless hands its use is not without a peculiar danger. Some ignorant persons, when they have done using a gas light, blow the flame out just as they would that of a lamp or a candle, instead of putting it out by turning the stop-cock, and so shutting off the supply. The latter is the only proper and safe way. The other is highly dangerous. When the gas flame is blown out in that way, the gas itself continues to escape in an undiminished stream, until it fills the room and suffocates the people in it, if it be night and they have gone to bed; or until some one comes in with a light, when the accumulated gas will explode with a tremendous concussion, sometimes rending the house in pieces and killing its inmates. But the use of gas in a proper way, with pipes and fixtures suitably constructed, is perfectly safe, and the only objection to it is its expense. Most people, however, in the cities and larger towns are very ready to pay the increased expense because of its manifold and obvious advantages.

The meter, as the instrument for measuring the gas is called, is a very curious affair. It is a plain metal box, about a foot square, generally painted black. The service pipe enters it at one point and the house pipe leaves it at another. All the gas that is consumed in the house thus has to pass through it, and in so doing it moves a very delicate and ingenious mechanism within, by which the quantity is exactly measured and recorded on little dials, like those of a clock, placed upon the outside of the meter. The measurement is in cubic feet, and the movement of the hands on the dial, tells at any given time just how many cubic feet of gas have been consumed since the last account was taken. Of course the gas does not pass through the meter except as it is escaping through the fixtures of the house; and since, when everything is in proper order, there is no such escape except as the gas is being burned, the meter registers the exact quantity. At regular periods the gas company sends a man to make a memorandum from the meter of the quantity of gas used, and the consumer is charged accordingly. The charge is generally so much for a thousand cubic feet.

Mr. Merrill wished to have the gas introduced into his new house, but there was a serious difficulty in the way. There was no *main* in the street, and of course there could be no gas until the main was laid. But Mr. Merrill had reasoned this way:

"It cannot be a great while before the growth of population will require a main in our street, and then, when we can have the gas, we shall certainly want it. But when, under these circumstances, we want it, we ca' n't have it unless the house pipes are all in. So the only thing to be done is to put the pipes in now, and have them all ready."

"Why can't you wait and put them in afterward?" asked Max, who was listening to his father's reasoning upon this point, as the plans were being made.

"Because the pipes have to be laid inside the walls, and that can only be done before the walls are finished, while the house is being built. It would be a very bad piece of work to tear away the plastering and lathing in every room all over the house, to lay in gas pipes. In fact, I don't think it could be done at all."

"Why could n't you lay the pipes outside the walls?" asked Max.

"They do that, sometimes," replied his father. "I have been in houses into which the gas had been introduced in that way. But the pipes look badly. It is a great deal better to have them out of sight, and in our case, when there is the probability of being able to use them before a great while, it is by far the best plan to put them in, in the proper way."

So as soon as the frame was fairly up, and before the lathing had been begun, the gas fitters appeared, with great bundles of iron pipes, which they proceeded to lay throughout the house, all the branches to the several rooms leading from one large pipe in the cellar, and each branch terminating in a room at the place where it was desirable to have a fixture. The gas fitters had pieces of pipe of a great many different lengths, and elbows, and "T"s, and curious tools of one kind and another, and did their work very rapidly. They took great care to make all the joints very tight, sealing them with a sort of cement, so that no gas could ever escape. As soon as the pipes were all laid, the lathing and plastering went on, and when the plastering was finished all that could be seen of the pipes was a round blank end, sticking out here and there in the middle of a ceiling or on a wall, where in time the fixture with its burner was to go.

CHAPTER XIV.

WATER WORKS.

THE gas pipes were, however, only one of the three kinds of pipes which had to be laid within the walls all over the new house at Long Look, before the lathing and plastering could go on to completion.

"Do you see the veins in my hand?" asked Mr. Merrill of Max, pointing to the bluish lines upon the back of one of his hands. "Our bodies are full of little pipes, running in every direction, carrying various fluids to maintain life. And it is just so in a house; there must be pipes of various kinds running all over it to carry the different fluids that we need."

"What is a fluid?" asked Max.

"Any substance the parts of which move easily among themselves under pressure. Wood is not a fluid, because the parts of which it is composed do not move among themselves when you press it.

"Is gas a fluid?" asked Max.

"Yes," replied his father. "And there are two other fluids which we shall make a great deal of use of in our new house when we come to live in it:—

water and hot air. We shall need pipes for them as well as for the gas."

There are some striking likenesses and differences between water and gas, as introduced under modern systems into houses and buildings of various kinds. In the first place, water is itself formed of two gases, known as *hydrogen* and *oxygen*. But then, in the next place, water is a natural element, to be used just as it is found. Burning gas, on the other hand, is an artificial product. It has to be extracted for use out of another substance. It is true, I believe, that in some parts of the world there are what are called *gas wells*, from which a gas, safe and suitable for burning, is emitted just as water from a well; and in this respect another likeness is furnished between the two. But such gas wells are far from being common; indeed, they are so rare as to be a curiosity. Water-wells, on the other hand, are common the world over. The earth beneath our feet is soaked with water like a vast sponge, and, except in desert regions, all that we have to do to find water is to dig a hole down into the earth for a few feet. For a single family such a well answers every purpose, though various contrivances have been resorted to for getting the water out of it; sometimes a pump is used; sometimes a curious mechanism called a chain-pump; and sometimes simply a bucket let down from above by hand, by means either of a long pole, or a rope passing over a windlass.

Where a large population exists, and the uses for water multiply, it becomes necessary to adopt some system of general supply. In these cases the nearest pond or river is selected for the purpose, and water from it is conducted into a reservoir built upon a hill sufficiently high to send it in pipes all over the town. The pipes are laid just as the gas pipes are laid; only they are a great deal larger. There are great mains in the principal streets, buried three or four feet under ground; and service pipes branching off from the mains to the houses; and house pipes carrying the water into those rooms where it is wanted. There is a faucet wherever the pipe enters a room, corresponding to the stop-cock in the gas-pipe, and the water is turned on and shut off just like gas.

Such substantially was the system in use in Bridgefields, the town where Mr. Merrill and his family lived. The river was the source of supply. There was the reservoir on the hill, not far from the house. As the water would not flow up the hill, it was pumped up by an immense engine located at a proper point on the banks of the river. From the reservoir the water was carried in pipes all over the town.

In order that water may flow in a given direction by its own force it is necessary that the point of starting should be higher than the point of delivery. The water from a reservoir could not reach any house, or a room in any house, which was higher than the surface of the water in the reservoir itself. There were houses in Bridgefields that were on higher ground than the reservoir, for the reservoir hill was not very high. What would have been a difficulty in this case was overcome by the erection of a *stand-pipe.* The stand-pipe was a large circular column of iron, forty or fifty feet high, placed on the edge of the reservoir, and connected with the flow of water from the river into the reservoir. All the water, as it was pumped up from the river, entered into the stand-pipe and ascended to the top of it. From that point the distribution of the water really began, and as the top of the stand-pipe was considerably higher than any of the houses in the town, the water was thereby furnished with a sufficient "head," as it is termed, to send a supply in all directions. Water will flow *down* of its own motion, but it will not flow *up* except as it is forced to do so. The force that drove the water up from the river into the stand-pipe was that of the huge pump worked by steam on the banks of the river. Max said he wished he could see this pump, and asked his father if he would not take him down some time for that purpose.

"I do not think there is any pump, or pumping, that we can actually see," said his father, "but there is probably some kind of machinery, and we will go down this very afternoon on our way home. It is n't very far."

Accordingly, as soon as Mr. Merrill had answered one or two questions which Mr. Stowe had to ask, and given some directions on points that had arisen in the work, they started for the water works at the river. They took a horse-car and rode for about half a mile, and then found a pretty little lane leading down from the main street toward a large and handsome building on the river bank. Connected with the building was a tall chimney from which smoke was issuing.

"That's the engine house," said Mr. Merrill, as they drew near it.

"The engine house?" asked Max.

"Yes," replied his father. "The pump that pumps up the water into the reservoir is a steam pump. I presume the pump looks like a great engine, and works like one."

On reaching the building they went in by a wide front door, and found themselves in a very large and lofty room, which seemed to occupy pretty much the entire structure. The floor was of brick and the walls were of stone, and the central objects were two immense machines standing side by side. It was at once evident that the building was simply intended to contain and shelter these machines. A prominent portion of each of them was a huge forked pipe which came up out of the floor, and connected itself in some way with the mechanism. One of the machines was motionless, silent and cold, but the other was at work, toiling, steaming and wheezing as if its task were a severe one.

"Those are the pumps, I presume," said Mr. Merrill, as they stood surveying the scene. Max was at first a little awed by it. Nor was it strange that he should have been. There was something in the spaciousness and solitariness of the apartment itself, and in the massiveness and strength of the engines, which suggested grandeur and power, and implied by contrast human weakness and helplessness. Max felt for a moment as if he had entered the abode of two giants who could easily grasp him in their mighty fingers and do with him as they pleased. But his confidence and assurance gradually returned as he became accustomed to the place, and he was quite ready presently to advance with his father nearer to the pumps.

At first it seemed as if they were all alone in the great room, but on approaching the working pump, they found a man sitting near it watching its operations. This was the engineer in charge. He bowed to Mr. Merrill, and proved to be very obliging, answering all his questions with great politeness.

"We work only one pump at a time," said the engineer, "about two months at a time. While one is working we overhaul the other. Then if one breaks down we have the spare one to fall back on."

"Do you work it day and night?" asked Mr. Merrill.

"No," replied the engineer, "only by day."

Mr. Merrill and Max remained in the engine house about half an hour. There was nothing for them to do but to sit still and watch the steady motions of the machinery, as, like a great heart, it kept up its beatings, drawing the water from the flowing river and sending it up through the great pipes to the reservoir on the hill; where, gathering "head" in the stand-pipe, it went forth through the underground net-work of mains, service-pipes and house-pipes to supply the people of the town.

CHAPTER XV.

PLUMBERS AND PLUMBING.

THE apparatus by which the water from a reservoir is carried about over a building and delivered at points convenient for use, is called by the general name of *plumbing*. The word "plumbing" means lead-work; and it is used to signify this water apparatus of a house because the pipes of which it largely consists are usually made of lead. One great excellence of lead for this purpose is its *pliability;* that is, it can be easily bent. Iron pipes cannot be easily bent. Wherever there is to be a turn there must be a joint. But a piece of lead pipe can be bent around a corner, or under a beam, or over one, with great readiness. Lead pipe, in fact, comes in coils like a rope, and can be straightened out as you would straighten a rope. This quality, together with the facility with which it can be worked—cut, spliced and jointed—makes it very useful in distributing water about a house.

Sometimes pipe made of other metal is used, as brass, for instance; but lead pipe is the more common.

The men who fit the pipes into their places, and perfect all the apparatus for the introduction of the water, are called *plumbers.* It is the *work* they do which properly is called "plumbing;" but the word has come to be used of the whole system of pipes and fixtures; so that when we speak of the "plumbing" in a house we do not mean only the *process* in which the plumbers are engaged, but the apparatus which is the result of their labors.

The water pipes of a house are hidden away in the walls and floors just like the gas pipes, though the plumbers do not do their work until after the gas-fitters have done theirs, nor until the house is well advanced toward completion.

There are, in general, two ways in which the water is brought into a house from the street, and distributed for the convenient use of its inmates. One way is to have the service pipe connect at once with the house-pipes, so conveying the water directly to the various sinks, wash-rooms and faucets where it is wanted. The other way is to have a large tank or cistern in the upper part of the house, to which the water is first conducted, and from thence it is drawn off as needed, by the pipes leading to the several rooms. This tank is a little reservoir all by itself, as it were. Each of these two methods has a name of its own with plumbers. The first they call a *pressure job*, the second a *cistern job.*

While Mr. Merrill was planning the house, and when the matter of the plumbing came to be considered, he studied up the subject carefully, talking it over with intelligent and trustworthy workmen, so as to form a sound judgment as to what he wanted done, and the way in which it should be done.

At first Mrs. Merrill did not want any plumbing at all. Before coming to Bridgefields her home had always been in the country, where water was drawn or pumped from a well, and carried about the house as wanted in pails and pitchers. "That's as good a way as any," she said. "Why can't we get along with a well? All this plumbing that you talk about costs a great deal, and gets out of order, and makes ever so much work." To which Mr. Merrill replied that it was very true that plumbing was a costly work, and that when the work was not well done it got out of order and made trouble. "But," he continued, "I don't mean to have a great deal of plumbing, and what I do have I mean shall be the very best, and I think when we finally get into the house we shall be glad enough of the convenience."

As between a pressure-job and a cistern-job, Mr. Merrill finally decided on the latter. Each has its advantages, and he thought those of the latter outweighed the former's. The pressure-job is much the simpler, the somewhat delicate mechanism by which the cistern operates being avoided. Therefore it is the cheaper. But, on the other hand, the strain on the pipes is stronger and less even, and they are more likely to burst. Connected as they are directly with the whole water system of the town or city, they feel instantly every increase of pressure, which sometimes may become greater than they can bear. The cistern-job requires more apparatus, more work, and hence costs more, but then it regulates and steadies the pressure of water in the pipes throughout the house, and in case of any trouble with the street pipes it provides a considerable store of water always ready for use. So that Mr. Merrill probably decided very wisely in favor of it rather than the other.

The plumbers brought the cistern one morning when Max was at the house, and he had a good opportunity to see them put it in. It was a large square box, lined with sheet-metal. But there was no cover. Max thought there ought to be a cover.

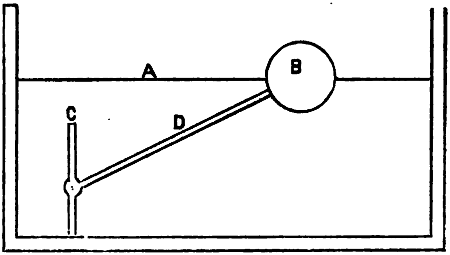
"I should think the water would run over the top, and leak all down through the house," he said, to one of the workmen.

"Oh, no," the workman replied, "We fix that with a ball-cock."

Max did not know what a ball-cock was, but he concluded not to ask then. He waited and asked his father when they went home that night. And I will give you here the substance of his explanation.

The problem in the case of a cistern for such a use as this is to control the supply of water, so that the cistern shall be always full and yet never overflow. The water runs in by a pipe at the bottom. If it ran over the top it would do a great deal of damage. It would do no good to have a cover fastened on, for the water, flowing under great pressure, would in time burst the cover off, and flood the house just the same. Some way must be found, therefore, to shut the water off when the cistern is full, and turn it on as fast as the cistern begins to empty by use. One way of effecting this would be for one of the people of the house to run up to the cistern every time any of the water had been drawn off, and, by turning a faucet in the delivery-pipe, let more in. But that would be a constant care and a very great inconvenience. Another way would be to station a small boy at the cistern, to watch the lowering of the water in it, and let more in as fast as it was needed. But such a boy, I am afraid, would get very tired, and much of the time he would have nothing to do. So a contrivance has been invented, which is attached to the cistern, and does the work of the small boy in a very effective manner. This contrivance is called a ball-cock.

If you examine the next faucets you see, you will find that sometimes they are made with a long handle, three or four inches long. Now imagine one with a handle a foot and a half long, and a large hollow metal ball about six inches in diameter, fastened at the end of the handle. In a cistern such as I am describing, the pipe which supplies the water is furnished with a faucet, or cut-off, like this. The long and slender handle is so adjusted that the ball at the



THE PRINCIPLE OF A CISTERN.*

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* A, surface of water. B, ball. C, delivery pipe. D, lever-handle.

end of it floats on top of the water. This it does very easily, being hollow and filled with air. When the water is very low in the cistern, the ball is low and the faucet is kept open, allowing the water to run in. But as the water in the cistern rises, the ball rises too, and by means of the long lever-handle gradually closes the faucet, until, when the water has reached within two or three inches of the top, the faucet is closed entirely, and no more water can run in. When, by and by, some of the water in the tank is drawn off for use below, the ball falls with the surface of the water, and so opens the faucet a little, enough to let in a fresh supply. Thus the cistern fills itself full and keeps itself full, and never too full, without any attention at all. Night and day the ball-cock keeps up its faithful service, never sleeping, never getting tired. The water is its own regulator. Such an arrangement is rather a delicate one, and requires a good deal of nice calculation and careful adjustment to make it work properly, but once in order it works very nicely indeed.

This was the contrivance which the plumbers attached to the tank in the attic of the new house at Long Look. And when the pipes were all in, and the connections made, and the water turned on, every thing worked to a charm. Max waited at the tank to see it fill, and when the ball-cock, faithful to its duty, finally shut off the incoming water at just the right time, his pleasure was very great indeed. Then he ran down through all the rooms, from faucet to faucet, turning each one to see if the water ran well. It ran beautifully.

CHAPTER XVI.

THE HEATING APPARATUS.

WHEN Mr. Merrill said, as related in a previous chapter, that there were three kinds of fluids to be conducted, by three different systems of pipes, over the house at Long Look, he meant gas, water, and hot air; and the hot air indicated that the house was to be heated by what is called a furnace.

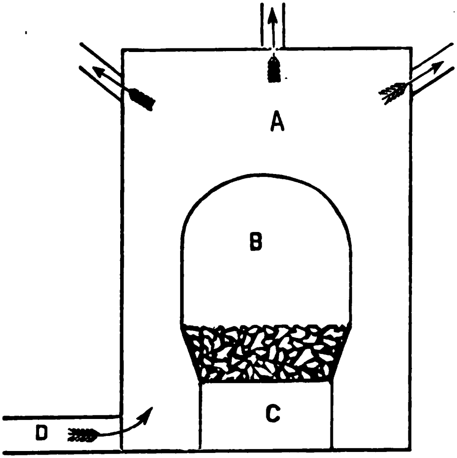
It may not be known to some of the readers of this book that in old times, and not so *very* long ago, either, stoves and furnaces for heating buildings were unknown. Not much more than a hundred years ago the only method in use was the open fire-place, with the wood fire. Even this was looked upon as a great improvement over the method of primitive times, when chimnies were unknown. Then the fire was kindled in the open room, and the smoke was left to find its way out by the windows, or through a rude hole in the roof, as well as it might. The chimney was a great invention. By means of it all the smoke from the fire was conducted directly away from the fire out of the room, into the open air. But, convenient and pleasant as was the open fire in the large fire-place in the days of our great-grandfathers, it allowed only of heating one room. All the rest of the house must be left cold. By and by stoves were invented. These were considered to be, in some respects, a great advance over the open fire-place; partly because of their economy of fuel, partly because of their economy of heat. A fire gives out heat by *radiation*, and one iron stove, heated by a fire within it, radiates more heat into a room than an open fire in a chimney-place, much of the heat from which goes up the chimney with the smoke.

After a time, somebody conceived the plan of making an immense stove, large enough to radiate a great deal of heat, and placing it in the basement or cellar of a house, with pipes leading from it to conduct the heat to the several rooms. This, in its simplest idea, is what is called a furnace, and such an apparatus is now widely used for the purpose of affording artificial heat. Its advantages are that it heats the whole house by a single fire, and is thus more effective with less coal than open fires. Its disadvantages are that the air which it supplies to the various rooms is apt to become over-heated, and so dry and unwholesome. To obviate this difficulty an open vessel of water is generally kept in what is called the hot air chamber of a furnace, the evaporation of which tends to moisten the air. The pipes which convey the hot air from the furnace to the several rooms are very much larger than gas-pipes or water-pipes. This is because a very much larger *volume* of hot air is needed than of gas or water.

A very small jet of gas will make an illuminating flame, and a small stream of water will answer every common domestic purpose. But to *flood* a house in winter with hot air, which is constantly cooling, or leaking out through the cracks of the doors and windows, requires a great quantity unceasingly supplied. The pipes are therefore very large, ten inches or a foot in diameter. They are generally made of tin, and it is a curious thing to note that the hot-air pipes of a furnace, at the points where they enter the room, are provided, just like gas-pipes and water-pipes, with a contrivance for shutting off the current of hot air, and turning it on. The principle in each case is the same; the stopping up of the pipe by something which just fits the inside of it, worked by a handle on the outside. In the case of the gas-pipe this is called the *stop-cock;* of the water-pipe, the *faucet;* of the furnace-pipe, the *register.*

It is necessary for a furnace to be placed in the lowest part of the building, on account of the law by which hot air always *ascends;* never descends unless forced to do so. Cold air descends naturally. The air in the lower part of a room is always much cooler than that in the upper part, as the reader can easily ascertain for himself, by climbing up on a step-ladder high enough to bring his head near the ceiling of a room. If a furnace were placed in the upper part of the house, the hot air from it would only rise higher still. It would not sink at all; and thus all the lower parts would be left cold as before. It would not do even to place it on the ground floor, for then the hot air would invariably heat the upper part of the rooms of that floor, and all the lower parts of the rooms would remain cold. People living in such rooms would invariably suffer from cold feet. But by placing the furnace in the cellar, and causing the hot air pipes to enter the rooms above at, or very near the floor, the heat is delivered at the lowest point, and, rising, warms the whole room.

There are very many different kinds of furnaces, made by different makers, called by different names, and having some differences of form and construction, but all are based upon the same general principle. There is, *first*, the fire, which is contained in a large, iron receptacle, lined with fire-brick, and called the fire-pot. Over this is what is called the hot-air chamber, a spacious apartment, also of iron, the air in which is heated by the fire underneath. The hot-air pipes lead from this chamber to the various parts of the house; and a constant supply of fresh air is brought in from the outside by means of the cold air box, which is a very large wooden tube, generally square, communicating with out-doors. The fresh air pushes in through the cold-air box into the hot-air chamber. Then it is heated by contact with the top of the fire-pot. Then, rising, it passes up through the hot-air pipes into the rooms above. Reduced to its simplest idea, this is the form and operation of a furnace, but as has been said before, there is an almost infinite variety of shapes and sizes, with all sorts of peculiarities of structure and contrivance, each one of which is claimed to possess advantages over all others. Sometimes the top of the fire-pot is a simple dome, as suggested in the accompanying illustration. Sometimes it is extended into a complicated series of tubes, and arms, and rings, which are thought to increase the heating power of the fire. Sometimes the furnace is made of cast iron; sometimes of wrought iron. One thing alone is of impertive necessity: that the furnace selected for a given house be large enough and powerful enough to heat it easily without being over-worked.



THE PRINCIPLE OF A FURNACE.*

"I consider that point," said Mr. Merrill to Max, "to be of the utmost importance. Some people would buy just the smallest furnace that would answer, thinking that such would cost less at the outset and consume less coal when in use. Then, when the cold winter days come, it is not equal to its work. The temptation is, some day when the thermometer is down below zero, to build up a tremendous fire. Then the furnace gets over-heated, and the house takes fire and burns down. Or, if no accident of that kind happens, the furnace is injured by being over-heated, and it soon wears out and has to be replaced. I mean to buy the *largest* furnace that will answer. To be sure, it will take more wood and coal to start the fire in it at the beginning of the winter, but once started it will take but little more to keep it up, and when the severe weather comes we shall have the satisfaction of knowing that we are keeping warm without danger of burning up or spoiling our furnace by over-heating it.

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* A, hot-air chamber. B, fire pot. C, ash-pan D, cold air box.

"Then," continued Mr. Merrill, "there is another very important reason for having a large furnace that will not have to be over-heated in cold weather. Burning coal throws off a certain gas which is very injurious to breathe. If the fire-pot of a furnace is allowed to get red-hot, as it will when over-worked, it becomes *permeable* by this gas, the gas escapes into the hot-air chamber, and thus the hot-air, which is to be delivered all over the house, is poisoned and rendered unfit to use. Do you remember what *permeable* means?"

"Yes," replied Max; "you said that gravel was permeable to water, because the water could soak through it, but it couldn't soak through clay."

"Precisely," continued his father. "When iron is made red-hot it expands, and the particles of which it is composed are separated so that the gas passes through. They are separated very slightly, it is true, but enough to allow the passage of the gas. And therefore, we must take great care to have a furnace so large that this over-working and consequent danger can be avoided."

Besides stoves and furnaces, there is another important method for heating buildings. This is by steam. Under this method the steam is generated in boilers placed in the cellar of the building, or in a separate structure close to it, and conducted into the several rooms by means of iron pipes and coils. These iron conductors become heated by the steam which fills them, and in turn radiate heat into the surrounding atmosphere. Steam-heating apparatus is of various kinds, all, however, based upon substantially the same principle; and the system has many advantages. It can be applied to the largest buildings, and is therefore very effective in factories, hotels and public edifices, where there are a great many rooms. But it is costly, and for this and other reasons is hardly suitable for ordinary dwelling houses. Mr. Merrill was quite wise in choosing a furnace, and not a steam apparatus, for the house at Long Look.

"One thing I mean to do," he said to Max, when the furnace had been selected and its location in the cellar determined upon; "and that is to have the coal bins in a convenient place, both for getting the coal in from the street, and for shoveling it into the furnace. Ten or fifteen tons of coal a year is a large quantity to handle, particularly when you consider that it has to be handled twice — brought in from outside in the fall and fed to the furnace all winter long." Accordingly Mr. Merrill took a great deal of pains in locating the furnace and arranging the bins to facilitate this labor as much as possible. The great bins for holding the coal were so placed as to be convenient on one side to a cellar window, down through which the coal could be dumped from without, and on the other side to the furnace door.

In addition to the furnace, which was to be relied on for the general supply of heat, Mr. Merrill caused a large open fire-place to be built in the "family room," as it was called, so that when desired an open fire could be enjoyed. This fire-place was made not of marble and soapstone, as is often the case in city houses, but of bricks of two colors — red and black, tastefully combined. It was very broad and deep, and at first the mason who had the making of it rather laughed at the plan, saying that the room was going to be "all fire-place," and that the bare bricks would be sure to look very ugly. But when the work was done, he had to admit that it looked better than he expected it would; and the fire-place, plain though it was, was a very cosy and inviting one indeed. It was broad enough to take in long sticks of wood, and on its completion Max found himself very impatient for the first snow storm, which his father promised should be the occasion of the first fire.

CHAPTER XVII.

THE FINISH.

IT was early spring when work had been begun upon the house at Long Look, with the laying of the foundations. The summer was far advanced before the structure approached completion. The early stages of the labor, such as the digging of the cellar, the masonry, the raising of the frame, the boarding in, and the roofing, had made the most impression upon the eye, every day seeming to add to the visible growth and to furnish new results by which to measure progress. As operations proceeded however, they became less and less noticeable, and when the later stages were reached but little progress was apparent from day to day. Max and his father continued their frequent visits to the building, and the former was inclined to be rather impatient with what he called the slowness of the men. "They work, and work, and work," said he, "and they don't do anything at all."

The finishing processes in the building of a house are indeed slow and tedious. The laying of foundations and raising of walls, the masonry, plastering and plumbing, the slating, the setting up of the furnace, and the putting in of gas-pipes, belong after all, to what may be called the framework of the building. All of it is of the utmost importance, and requires to be done honestly, carefully and thoroughly; but little of it is delicate work, and the time which it consumes is often less than that which is requisite for the finishing proper.

There are numberless questions which arise, and a great variety of methods to be employed, in the "finishing" of a house, and the consideration of these gave Mr. and Mrs. Merrill and the children much to talk about. One point, for instance, though it was practically settled before the house was begun, was that of the interior wood-work. After the walls of a house have been plastered, and the plastering is thoroughly dry, the casings about the doors and windows have to be put in, with the wainscottings or wash-boards; and there are floors to be laid and doors to be hung. Sometimes hard woods are used for this purpose, such as walnut, chestnut and oak, which can be left unpainted, being susceptible of a high polish. If pine be used it is commonly painted in white or plain colors, the doors being sometimes grained in imitation of the hard woods.

Graining is a very curious and beautiful process for painting one wood surface in imitation of another. The grainer first covers the surface of the wood with a plain color, corresponding to that of the wood he desires to imitate. When this has dried he applies a second coat of lighter or darker hue, according to the effect which he desires to produce. Then by means of the end of his thumb which he covers with a bit of rag or soft leather, and by aid of tools like combs of various sizes and degrees of coarseness, he scrapes away parts of the outer fresh coat of paint, leaving the under dry coat exposed to view; the effect being a resemblance to the grain of the wood he wishes to imitate. A skilful grainer will secure this resemblance in a very marked degree, and there is a singular fascination in watching the artistic designing and dexterous manipulation under which he brings knot and twist and vein out of the dead surface upon which he is working.

Mr. Merrill, however, decided not to have any graining done in the house at Long Look. "If I could afford it," he said, "I would like to have all the interior wood work of solid walnut or oak. But as I can't do that, we will have pine painted in some pretty color. Paint is paint, but graining is after all only a cheap kind of imitation.

After this question of wood-work and paint had been settled, came the matter of "trimmings." The "trimmings" of a house comprise all such articles as door handles, locks, hinges, window fastenings, etc. It was a part of the contract with Mr. Stowe that Mr. Merrill should furnish the trimmings. He proposed to do this himself because such little appliances are more or less conspicuous, and in the selection of them there is room for the exercise of considerable tact and judgment.

Then there arose an important question about the walls. Mr. Stowe's contract carried the finish of the walls no further than the skim-coat of plaster. This plaster answers very well, so far as durability and use are concerned, but it is generally thought desirable to cover the surface with paint or paper for the sake of the appearance. Paper is the cheaper for this purpose in the beginning, but paint is more lasting and so is cheaper in the end, though the first cost of its application is much greater. The reason of this is that the porous condition of the plaster surface makes four or five coats of paint necessary to a complete and smooth covering; whereas of paper, one layer answers as well as two. But in the case of a new house it is not well to apply either paint or paper to the walls too soon. It is always better to wait a year or two, until after the walls have become thoroughly seasoned, and until they have undergone the settling which new walls invariably suffer. This settling produces cracks in the plastering, and it is not wise to either paint or paper until there has been time for those cracks to form and to be filled up. Mr. Merrill had decided that the walls of his house should eventually be painted, but that nothing should be done to them until after a year or two of occupation.

One room, a little boudoir for Mrs. Merrill, he set apart for an experiment with wood-hangings.

Wood-hangings are a form of material lately introduced for this purpose, and making a very beautiful finish for an inside wall. The process by which the hangings are manufactured is almost as wonderful as their effect when applied to a wall is fine. A log of valuable wood, such as walnut or cherry, is placed in a machine and so made to revolve upon its central axis, that a knife, held firmly against its outer surface, pares away a continuous shaving of the wood, as the log turns round and round. This great shaving is much like that which falls from a carpenter's plane, except that *that* runs lengthwise of the wood, while *this* runs crosswise. The shaving is so wide and so long that it looks quite like a roll of wall-paper, and is called a wood-hanging, just as that is called a paper-hanging. It is applied to a wall in much the same way, except that it is first *backed* with a lining of brown paper, and in that condition pasted against the wall. The wood surface could not be made to adhere directly to the plaster-surface by means of paste, but the paper medium readily adheres to both plaster-surface and wood-surface, and so binds the two firmly together. When the wood-hanging is fixed in its place, its outer surface is carefully smoothed and polished, and the effect is often heightened by means of panels and mouldings. Mr. Merrill had seen a room so finished in a city house and was so pleased with its appearance that he determined to adopt the plan for Mrs. Merrill's boudoir. It was, however, to be a secret, and Max alone was made a party to it.

Thus, little by little, the work advanced. The joiners followed the masons, and the painters followed the joiners, until the final touches were put on. And at last the house was pronounced finished, and the day fixed for moving in. But the account of that exciting event must be deferred to another chapter.

CHAPTER XVIII.

MOVING IN.

SEPTEMBER was the month when the lease of the house Mr. Merrill and his family had been living in expired; and September was the month when the new house was pronounced finished; so September became the month for moving in. As the time approached the excitement among the younger members of the family ran high, and the minds and hands of all began to be busy with preparations.

"Fortunately," said Mr. Merrill one morning at the breakfast table, when definite plans for the removal were fairly up for discussion, "we have n't a great many things to move. There'll be our trunks, with all our clothing and such things, and the beds and bedding, and the books and pictures; but that's about all."

"Why," asked Max, "are n't we going to take the tables and chairs?"

"No," replied his mother, "none of the furniture in this house belongs to us. It belongs to the house. We hired it when we hired the house, with it."

"Why," rejoined Max, in a continued tone of surprise, "do you hire furniture just like a house?"

"Yes," replied his father; "very often people do. it takes a great deal of money to furnish a house, and sometimes when a family do not want to occupy a house very long, they like to hire one that is already provided with the heavier and costlier articles of furniture, such as carpets, sofas, bedsteads, bureaus, stoves, tables and chairs. It is better for them to pay rent for these, than to buy them outright, and then have to sell them after a little while at a loss.

"Was that the way you did?" asked Jenny.

"Yes," replied her father. "When we moved here, five years ago, we didn't expect to stay but a year, and not knowing where we should go to live next, your mother and I thought we had better not be at the expense of furnishing a house ourselves, but hire one ready-furnished. That is the reason we took this house. Mamma brought her own bedding and silver and such things, and the pictures, and the books and the piano are ours; but everything else belongs to our landlord."

"And, papa," asked little Maud, "will somebody else come in and live in this same house and use our things after we are gone out?"

"Yes," replied Mr. Merrill. "Mr. Holton told me he had got another tenant who would move in the first day of October, the very day after my lease expires. And that is a reason why we want to move out promptly. I should like to leave the house a few days before the end of the month, so as to give Mr. Holton time to do anything to it which needs to be done."

"But what are we going to do for furniture in our new house?" asked Jenny. "Are n't there any carpets on the floors?"

"Not yet," replied Mr. Merrill.

"Nor beds to sleep in?" asked Max.

"No bed-*steads*."

"Nor chairs to sit in?" asked little Maud.

"No, only your high chairs."

"Papa and mamma could n't sit in our high chairs very well," observed Jenny, laughing.

"But what are you going to do about furniture?" asked Max, taking a serious view of the case.

"Oh, your mother and I will have to go to town and buy some. We 're going very soon."

"I think," said Mrs. Merrill, "that the best way would be to go into the new house with such things as we have, and then get what we want little by little afterwards. We can tell a great deal better about our carpets and our chairs and other things after we get used a little to the strange rooms."

"But what would you sleep on?" asked Mr. Merrill. "And how should we eat, and where would you sit down?"

"Oh," replied Mrs. Merrill, "we can get along very well for a few days, or a week or two. We have our *beds*, you know, and we could spread them right out on the floor, any where. Then for a table to eat at, we could take a box. And for seats — well, I don't know exactly what we should do for seats, unless —

"We might buy half a dozen common kitchen chairs," interrupted Mr. Merrill, "and get along with them for a while."

"Yes, do!" exclaimed Max, who by this time had fully measured and weighed his mother's rather novel plan. "That would be splendid—a kind of camping out, would n't it, papa?',

"Yes! Yes!" shouted Jenny and Maud, catching their brother's enthusiasm, and clapping their hands by way of emphasis.

The "camping-out" plan, as Max called it, underwent considerable further discussion, and the result was that it was finally decided to adopt it. Mr. Merrill seemed to have some misgivings to the last as to its feasibility, but the children were all very earnest about it, and their mother continued to favor it in spite of all the difficulties in the way. And, as it proved, the plan worked very well indeed.

The only untoward incident that occurred during the moving was a heavy shower, which burst from the clouds just as the wagon-load of baggage had started. The day which had first been fixed upon for taking possession of the new house had been very rainy, and the removal had to be postponed, much to the disappointment of the children, who studied the clouds through the windows with great anxiety, and proclaimed omens of clearing up which were not fulfilled. The next day broke lowery and threatening, and for a time Mr. Merrill was in doubt whether it would be safe to make the attempt even then. But the trunks were all packed, and everything was ready, and as the team came about one o'clock, and the distance was not very far, and especially as it would have been exceedingly inconvenient to wait another day, it was determined to take the risk.

Two wagons came to carry the things. The men who drove them got them nicely packed, and, by way of extra precaution, covered the tops and sides of the loads with a great canvas sheet which came well around and down over all, and, it was thought, would amply protect what was underneath in case of a shower.

Shower there was, and a heavy one, before the wagons had been gone ten minutes. Without the least warning the rain began to fall in great drops, and for quarter of an hour it "regularly poured." Then with a flash the sun came out, the clouds rolled away, and the afternoon became pleasant and warm, It was a "clearing-up shower."

"Oh dear me!" exclaimed Mrs. Merrill, when the first patter of the rain began to be heard. "What will become of my poor beds?"

"A good omen," replied Mr. Merrill, when the rain ceased and the sun broke forth. "All the clouds and darkness we'll leave behind, and in the new house have only sunshine."

The wagons got along better than Mrs. Merrill had feared. They got along *faster* in the first place, and at the point which they had reached when the shower struck them, it was not so heavy as at the house which they had left behind. Then the protection afforded to the wagons by the canvas covering was quite effective, and their contents, when they came to be unpacked, were found to be comparatively dry and uninjured.

It had been arranged that immediately after dinner, the last meal which the family were to eat in the old house, Carry Ann and the children should go up to the new house, which they could do very easily by the horse-car, and have it opened; while Mr. and Mrs. Merrill should wait to see the wagons started and the old house closed. Then they were to follow on. Carry Ann and the children reached the new house in due season, without any remarkable adventures by the way, and were quite busy for a little while in unlocking doors, and opening blinds, and throwing up windows, and letting in the fresh air. The house had been pretty closely shut up for several days, and the air within was hot and heavy. There was also an odor of fresh paint, which Carry Ann, who was an excellent housekeeper, declared must be got out of the house "quicker 'an no time." "It'll never do," said she, emphatically, "to go to sleep in such a smell as this." The house was, of course, almost entirely empty. The rooms were bare and desolate, and the footsteps and voices of the children echoed noisily as they ran about on their various errands.

When the shower came up it produced a momentary gloom over the party. Little Maud grew silent, Jenny's face assumed an anxious look as she thought of the loaded wagons, and wondered if they would n't get wet, and Max thoughtfully ran to the open windows to see if the rain was beating in at any one.

One window, however, he forgot, and what happened in consequence will be related hereafter.

The time quickly passed, the shower cleared up, and, with the arrival of the wagons, the spirits of the children rose again, and to a higher pitch than ever. The men had only fairly begun to unpack when Mr. and Mrs. Merrill arrived, and in a very little while the new house presented a scene of great excitement and activity. Mrs. Merrill stood at the front door, and as the men entered with the goods, directed to what part of the house they should be taken. The books and pictures were put in the hall.

"I should think you'd have them put in the parlor," said Max, who stood by his mother watching the operations,

"No," replied his mother. "It is better to leave them in the hall, the books especially. We can't well take them out of their boxes until the book-cases are ready to receive them, and we can't bring in book-cases until the carpets are down, and we have not even bought our carpets yet. If the books were taken into the parlor now, they would have to be brought out again, and so it is easier to leave them out in the beginning."

Besides the pictures and the boxes of books, there were chests of bedding and trunks of clothing and personal effects, all of which were sent up stairs. There was also a curious old oak chest bound with straps of iron, in which Mrs. Merrill kept her silver; and a tall ancient clock, with a face like a round moon, which had belonged to Mr. Merrill's great-

great-grandfather, or somebody like that, and which he guarded as the apple of his eye. "Handle it tenderly," he said to the men, "it's the only old grandmother I have." The men laughed. The old clock was placed for the time being in a corner of the hall, and the great oak chest was lugged into the china-closet.

"Guess there's flat-irons in *that*," said Jim, as he let it down heavily on the floor. Jim was one of two colored men who had charge of the moving.

So little by little the unloading was accomplished, and everything was safely brought in. At half past four o'clock the wagons drove away, and the family were left alone in the new house.

"Now," said Mr. Merrill, as the children gathered about him, "the very first thing I want to do is to dedicate our new house. When night comes we shall all be too tired, I expect, to have family worship; and I propose that now, before we have begun to unpack or do anything, we have a little service of dedication. It will not take us long, and we shall have the satisfaction of feeling that our first act in our new home has been to remember our Heavenly Father's goodness, and to ask his continued blessing."

This proposal was unanimously approved. So, Carry Ann having been called in from the kitchen where she was building a fire, and all sitting down wherever they could, Mrs. Merrill in the only chair that had been brought with them, and the others on boxes, bales, or on the floor, Mr. Merrill repeated the Twenty-third Psalm, beginning, "The Lord is my

Shepherd, I shall not want." Then all knelt and he offered a short prayer, thanking the good God above for all his loving-kindness, recognizing the new house as a gift of his hand, and invoking his blessing upon the new stage of their lives which they were about to enter. The whole service did not take more than five minutes, and it had a very refreshing and cheering effect upon all.

"It don't seem lonesome a bit, does it?" said Jenny to her mother, as they addressed themselves again to the work before them.

"It is now not quite five o'clock," said Mr. Merrill, looking at his watch. "There are at least three hours before we shall want to go to bed. And there are two things which must be done before we can do that—one is to get some beds ready, and the other is to have some supper."

"And how can we have supper, papa?" asked little Maud. "We have n't any table or any chairs."

"We can make our table," replied her father, "and I'm going to do it now. You can come with me and see how, if you want to."

So saying Mr. Merrill led the way down into the cellar, which proved to be a large and well lighted basement rather than a cellar. In one corner lay a pile of boards of various lengths and widths, which had been left by the carpenters, and near by stood a pair of carpenter's horses. From this pile of boards Mr. Merrill selected three of about equal size, and then he and Max, who had followed on, carried these and the two horses up stairs into the dining room.

Placing the horses at a convenient distance from each other in the center of the floor, he laid the boards upon them, side by side, the width of the three together being a trifle more than the length of the horses. The horses made the legs, and the boards made the top, of the extemporized table. Then Mrs. Merrill covered it with a cloth which she had been careful to pack in an accessible place in the till of one of her trunks. It made a very nice table indeed, only it looked rather low.

"It would be too low," said Mr. Merrill, "if we had ordinary chairs to sit in at it. But we have n't, and it's just about high enough if we sit on the floor!"

Max, who had been pondering this difficulty for a moment or two, here ran off down into the cellar, and presently reappeared saying:

"Papa, there are some barrels down cellar. Why could n't we have barrels instead of the horses for legs? they would be just about high enough."

"But they would n't be wide enough across the top," replied his father.

"We could put a short cross-board over the top." replied Max, "that would be as long as the horses, and then lay the table boards on *that*."

"So we could," said his father, "that would do nicely."

Accordingly, the table was taken apart, and the horses carried back to the cellar and exchanged for the barrels; while from the pile of boards Mr. Merrill selected two others of the same length with the horses. Returning to the dining room, Mr. Merrill and Max stood the barrels in the proper position, laid the cross-boards on the top, and then replaced the long boards as before. The cloth was then relaid, and the height found to be exactly right. Just at this moment an express wagon drove up to the door, bringing the six kitchen chairs which it had been determined to buy.

"Now we're all right," said Mr. Merrill. "We can eat our supper like princes and kings."

Meantime Carry Ann had got on famously with her fire and her cooking. "The range 'draws' beautifully," she said, in reply to a question from Mrs. Merrill; "and I guess it's going to bake good, too," she added, as she put her hand into the hot oven. In due time supper was ready, and the family sat down to it with great appetites. There was tea for Mr. and Mrs. Merrill, a pitcher of milk for the children, and some cold tongue and baker's rolls warmed in the oven for all. Max declared he had never eaten such a good supper in his life before. And all had a merry time of it at this, their first meal in the new house, around the barrel-table.

Just as Mr. Merrill was finishing his last cup of tea he happened to look up, and his eye met a sight which caused him to utter a loud exclamation.

"Why, what's that! Have we sprung a leak already?"

All started, and, looking up in the same direction, saw a great dark patch upon the ceiling, evidently caused by water that had soaked through from above.

"It's right under the bath room, isn't it?" asked Mrs. Merrill.

"Yes," replied her husband. "I hope the plumbing has n't got out of order the first day." And he hastened up stairs to see what was the matter. Going to the bath-room, he found no signs of any disorder there, and for a moment he was at a loss to know what the matter could be. In a moment more, however, a new thought struck him, and ascending the attic stairs he found at once the explanation of the trouble. The skylight in the roof was wide open, and had been so during the shower of the afternoon. The rain had beaten in, making a great pool upon the attic floor, and it was the water from this which had trickled down and soaked through into the ceiling of the dining-room. The first thing to be done was to call Carry Ann to come with a cloth and mop up the pool in the attic. "Then," said Mr. Merrill, "there will be no more water to soak down through, and the wet plastering will soon dry."

"I never thought of the skylight," said Max looking on rather mournfully, and speaking in a tone which implied that he thought himself a little to blame for the accident.

"Why, it is n't your fault at all, my boy," said his father. "If it is any body's fault it is mine, for I left the skylight open myself yesterday, and it was rather careless in me, I must say. It was very thoughtful in you to go and shut the windows. We shall all remember the skylight after this."

When supper had been finished, Mrs. Merrill and Carry Ann proceeded to unroll the mattresses and undo the bedding, and make up the beds upon the floors in the several rooms. This was easily done, and the beds looked very comfortable indeed. At any rate their respective occupants found them so, when bed-time came, and at an early hour children and all were fast asleep.

CHAPTER XIX.

THE FIRST CALLERS.

THE first night in the new house at Long Look passed off without any strange adventures, and with as great a degree of peace and comfort as could have been expected under such novel circumstances. Jenny and Maud slept soundly all night, and so did their father and mother; Max alone seemed to be the wakeful one. For he was the only one who heard the whistling and puffing of the locomotives in the distant freight yard across the river, and as soon as his father was up the next morning made due inquiry of him for an explanation.

Carry Ann had breakfast ready surprisingly early, when it is considered how new every thing was in the house and what disadvantages she had to contend with. The barrel-table served as good a purpose as it had the night before, and the appetites were, if possible, a little better. In the course of the conversation which ensued as the family were eating, Mrs. Merrill asked:

"Who will be our first caller, I wonder?"

"Aunt Katherine!" exclaimed little Maud.

"The postman," followed Jenny.

"The butcher's boy," suggested Max; and none of these answers seeming to find general acceptance, he added, "Who do you think, papa?"

"Oh, I don't know," replied Mr. Merrill. "Some peddlar, I guess; perhaps a lightning-rod man."

"Papa!" exclaimed Jenny in an incredulous tone. "What kind of a man is a lightning-rod man? Does he look like a lightning-rod?"

"He's a man who puts up lightning rods on people's houses," replied Mr. Merrill. "These men go around the country in wagons trying to sell their rods, and whenever they see a house without any, and especially a new house, they generally try hard to get a job. I wonder there has n't been one of them here before this."

"Do lightning-rods really keep off the lightning, papa?" asked Max.

"No," replied his father, "not exactly; they say they attract it."

"Then I should think it would be dangerous to have them on a house."

"It is, unless they are made in the right way, and properly put on. And even then I believe there is a difference of opinion among good judges how much of a protection they really afford."

"But how," persisted Max, "if they attract the lightning, can they protect the house at all?"

"It is something like this," replied his father. "Suppose we lived in a house under a hill on the top of which was a pond. And suppose the situation of our house, as respected the pond, was such that, if the water should break out of the pond it would naturally flow right down upon our house. And then suppose there was a great rain, and the pond was filling up, and we were afraid it would break through upon us; what should we do under those circumstances?"

"Let the water out on some other side," replied Max.

"But suppose it could n't be let out on another side? Suppose there were hills all around the pond on every side except the one towards our house, and that in that direction alone the water could run away. What would you do then?"

"Well," replied Max, after a little hesitation over so perplexing a problem; "I should think you could dig a deep trench from the pond right down *past* the house, a little way from it, so that the water, if it ran out, would go by the house and not touch it."

"Precisely," said his father. We should provide a safe channel for the escape of the water; and if the danger were great we should probably begin to draw off the water from the pond before it reached the bursting point. And yet would n't that be protecting the house by drawing the water towards it?"

"Yes, *past* it," replied Max, not exactly *toward* it."

"Well, past it," continued his father. "And that is exactly what, in theory, a lightning rod does. It provides a safe channel for the electricity to pass down out of the clouds into the ground and so away. The cloud is the reservoir filling up so full of electricity that there is danger of its bursting out upon us.

The iron rod fastened to the building is the channel by which the overflowing electricity is conducted safely *by* the house away into the ground. For that reason it is sometimes called a *conductor*."

"They have conductors on the horse-cars, don't they, papa?" asked little Maud, who, as she munched her bread and butter, was listening attentively to the conversation, without, however, understanding very much about it.

"Yes," said her father, "but these are a different kind of conductors."

"I should think, then, said Mrs. Merrill, "that lightning rods were very important, especially where there are so many thunder showers as we have."

"There are a great many things," replied Mr. Merrill, "which, in theory, are very important and useful indeed, but practically, far less so. If we could have a *perfect* lightning rod it would undoubtedly be a real protection, but a perfect one is impossible, and an imperfect one is worse than nothing."

"Why is it worse than nothing?" asked Max.

"Well," continued his father, "a lightning-rod must be in one connected piece, for if there is any interruption at the joints, the lightning, as it passes along them, will jump off into the house. Then the points at the upper ends, on top of the house, must be kept very sharp and bright, or they will not receive the electricity from the clouds. And more than all, the rods must go deep down into the earth, deep enough to touch moist places, or else the electricity can't leave the rod easily. Now all these things are difficult to secure, and the absence of them makes a rod more of a danger than a safeguard. And if we had rods on our house I should be continually fearing, when a thunder-storm came up, that the points had got rusty, or that the joints had got separated, or that the rods had not been carried deep enough into the earth. Still, I suppose that reasonably perfect rods can be applied, and I don't know but we had better have them here."

Just at this moment there was a loud ring at the bell. It was the first time it had been rung by any strange hand, and for the instant the children were all startled.

"There's our first caller," said Mrs. Merrill. "Now who is it? we shall see who guessed right."

Before Carry Ann could get fairly started from the kitchen to answer the signal, Max had bounded to the window, and in a moment came running back in a state of great excitement, exclaiming in a loud whisper: "Papa, it *is* a lightning-rod man, I verily believe. There's a wagon there that looks just like a lightning-rod wagon, long and red; and besides it's got 'Rocket Rod Company' painted in great letters on the side."

Max was right. A lightning-rod man it proved to be, and his arrival under such circumstances, at such an early hour in the morning, produced a great sensation. All the children followed Mr. Merrill to the front door, and through it out upon the steps where stood the caller; all eager to hear what was to be said, but standing cautiously at a proper distance, and dividing their eyes between the man and the wagon.

In the course of the conversation which ensued, the lightning-rod man, as we will continue to call him, explained that he was the agent for the "Rocket Rod Company, the most reliable company in the business," he said, and noticing this new house, he had called to see if Mr. Merrill would n't like it rodded. He knew Mr. Merrill's name, and talked in a very familiar and friendly way; so friendly and familiar, in fact, as to make a quick and deep impression upon Maud, and to cause her in a moment to run back to her mother in the house, and tell her that he was "a nice man."

Mr. Merrill listened patiently to all the stranger had to say in behalf of himself and his rods, and then replied that he did not doubt that it was all true, but that he was not prepared to give any order for rods that day. "Besides," he added, "the summer is about over now, and we shall hardly have any more thunder showers — at least no serious ones. I hardly think I shall do any thing about lightning-rods until next year, if I do then."

"Well, now, look here," persisted the man. "I don't care anything about the *pay*. I think more of protecting your house than I do about the pay. I'd like to rod your house, first rate, and I'll do it well, and wait for my pay three months, or *six* months, if that will be any object. "I'd just like to show you," he said, "a sample of our rods;" and before Mr. Merrill could interpose an objection he had started for his wagon. He presently returned with an iron rod about eight feet long in his hand. The rod was curiously twisted, and at its upper end it bore a very handsome point, sharp, and bright with fresh new gilding."

"Is n't it pretty?" said Jenny in a whisper to Max; "I *do* hope papa will let him put them on."

But neither the sample rod, nor all the praises which the agent lavished upon it, availed to produce any further impression upon Mr. Merrill, and finally the man gave up his undertaking, mounted his gay wagon, and drove reluctantly away.

"I wonder," said Mr. Merrill, half to himself and half to the children, as the wagon disappeared around the corner and he turned to enter the house — "I wonder whether lightning rods such as that man would put up would really be a protection. I have to go to the insurance office this very day, and I'll see what they have to say about it there."

"Is the insurance office here in Bridgefields," asked Max, "or in Boston?"

"In Boston," replied his father. "Mr. Kemp's."

"And may I go in with you when you go?"

"Yes, unless you think you can be more useful here. You can ask your mother, and do as she thinks best."

The result was that Max got cordial permission to go, and the expedition was set down for the afternoon.

While the interview with the lightning-rod man was progressing, a little girl had appeared on the street carrying a basket on her arm. She had stopped a little way from the house, and stood still, apparently watching the proceedings on the doorstep, as if not exactly liking to draw any nearer while so many people were assembled. None of the group had noticed her, except Jenny, whose sharp eyes nothing escaped, and who had seen her as she turned the corner and came to a standstill a little way beyond the gate. She was a nice looking little girl, and Jenny thought she would be a good girl to play with, and wondered who she was. She wondered particularly what she had in her basket, which seemed to be pretty heavy. Jenny was the last to re-enter the house, and her last act was to peer through the crack of the door and take a parting look at the little girl. She had just taken up her basket, which she had set down while standing by the fence, and was beginning to walk along toward the house.

In a minute or two more there was another ring at the bell. The children were already busy about something else, but Jenny, emboldened by the first doorstep experience of the morning, turned quickly and ran to open the door. Who should she find waiting outside but this same little girl with the basket. She looked as if she might be a year or two older than Jenny, and she was very neatly dressed. She had a queer shaped straw hat on her head, such as you sometimes see in a Chinese or Japanese picture, without any crown, but with a very broad, straight brim, and her hair was smoothly knotted behind with a bit of brown ribbon. The heavy basket was full of apples, which peeped through under the cover all around.

"Good morning," said the little stranger. "My name is Alice Walker. I live in that house just over there, and I brought you over some apples. We thought that may be you'd like some."

The house she pointed to was in plain sight, just around the corner on the next street.

Jenny was taken rather by surprise, and did not know exactly what to do. So after standing for an instant, and trying in vain to comprehend the situation, she replied: "I'll see;" and, leaving the door ajar, ran off as fast as she could go to find her mother.

"Mamma! mamma!" she cried, "where are you? There's a little girl at the door with some apples for us. She says her name is Alice Walker, and she lives in that house right over there."

Thus summoned, Mrs. Merrill repaired to the front door, closely followed by Max and Jenny and Maud, all of whom studied their second caller with even more interest than had been excited by the first.

"You are very kind," said Mrs. Merrill; "come in and see the children, while I empty the basket."

So the little girl came in, and Mrs. Merrill led the way into the dining-room, and proceeded to take the apples out of the basket very carefully, one by one, and lay them on the barrel-table. They were beautiful apples, large and rosy, and looked as if they would be very nice to eat.

"You are a very friendly little girl, I think," said Mrs. Merrill, as she removed the last apple, and handed back the basket.

The girl smiled. "They call me that sometimes," she said, turning a trifle red, and dropping her eyes.

FRIENDLY WALKER.

"What? *Friendly?* Friendly W[illegible] [illegible] Mrs. Merrill, looking rather amused.

"Yes," was the answer. "They call me [illegible] a great deal more than they do 'A[illegible]' [illegible] know why. It's a kind of a nick-name, I s[illegible]. My middle name is Freund, and Friendly [illegible] easy, you see, from that."

"There is some other reason than that, I expect," rejoined Mrs. Merrill. "At any rate, I [illegible] 'Friendly' is a very excellent name."

"Mother said I might ask you if there was any thing I could do to help you," said the little [illegible], "or anything that she could do. And if there is, she wants you to be sure and let her know."

"Thank you," said Mrs. Merrill, "I expect Jenny and Maud would like to have you stay and see them a little while."

"Well," said Friendly, with a tone of great satisfaction, "I should like to do that very much indeed. [illegible] sisters myself, nor any mothers either, and I would [illegible] play with your little girls very much. Only, I hope I sha'n't be in the way. I shall be very glad to get acquainted, and I think we shall be very good friends."

All this served the purpose of a most effective introduction, and in a few minutes the four children were on as pleasant terms as if they had known each other a long time. Friendly proved herself a very agreeable acquaintance, and [illegible] her gentle demeanor and kind disposition, explained the origin of her curious name. She stayed more than

FRIENDLY WALKER.

"What? *Friendly?* Friendly Walker?" asked Mrs. Merrill, looking rather amused.

"Yes," was the answer. "They call me 'Friendly' a great deal more than they do 'Alice.' I don't know why. It's a kind of a nick-name, I suppose. My middle name is Freund, and Friendly comes easy, you see, from that."

"There is some other reason than that, I expect," rejoined Mrs. Merrill. "At any rate, I think 'Friendly' is a very excellent name."

"Mother said I might ask you if there was anything I could do to help you," said the little visitor, "or anything that she could do. And if there is, she wants you to be sure and let her know."

"Thank you," said Mrs. Merrill, "I expect Jenny and Maud would like to have you stay and see them a little while."

"Well," said Friendly, with a tone of great satisfaction, "I should like to do that very much indeed. I haven't any sisters myself, nor any brothers either, and I would like to play with your little girls very much. Only, I hope I sha'n't be in the way. I shall be very glad to get acquainted, and I think we shall be very good friends."

All this served the purpose of a most effective introduction, and in a few minutes the four children were on as pleasant terms as if they had known each other a long time. Friendly proved herself a very agreeable acquaintance, and by her gentle demeanor and kind disposition, explained the origin of her curious name. She stayed more than an hour, and when she went away, Jenny said she was the nicest girl, and had the prettiest name, she ever knew.

Friendly Walker became a frequent visitor at Long Look House, and a great favorite with all the people who lived in it.

CHAPTER XX.

INSURANCE.

IN the afternoon, immediately after dinner, Mr. Merrill and Max started for the city, on their errand to the insurance office. They took one of the horse cars, which passed every few minutes by the foot of Elm Street, and rode, by a pleasant route along a broad and winding street, first to the "Center Square" of Bridgefield, where they turned into a long straight avenue, which led directly to the city. At its distant extremity, two or three miles away, they could see the buildings of the city itself, overhung by the dim pall of smoke which usually rises from such scenes of busy activity. While they are on their way, it may be well to furnish some explanation of the nature of their errand.

Insurance is an arrangement by which, in consideration of the payment of a small sum of money, a company of men, duly organized for the purpose, agree to take the risk which property suffers of loss by fire or other disaster. Sometimes it is a ship which is insured. In that case the owners of the ship pay the insurance company a specified sum before sending her forth upon her voyage, and the company bind themselves, in case the ship is wrecked, to pay back to the owners of the ship her value, or a specified part of her value. This is called marine insurance. In the case of a house or other building, the insurance is against fire, but upon the same general plan. Human lives are also insured against accidents and against death. The principle in all these cases is the same: the payment by the persons wishing to be insured of a certain sum of money, small in comparison with the value of the thing insured, in consideration of which an agreement is made by the insuring company to bear the loss, or a certain part of it, if any occurs. The amount for which the property is insured is called the *risk;* the sum which is paid for the insurance is called the *premium;* and the written agreement between the insurers and the insured is called the *policy.*

The grounds on which insurance rests, as a practicable and profitable business, are very easily understood. Here, we will suppose, are a hundred houses, worth each ten thousand dollars. Their total value would be one hundred thousand dollars. Now it has been found by careful observation that out of a hundred houses, in a given situation, only a certain number, perhaps one or two, are likely to be burned in a long period of time. This is called the doctrine of chances, and the study of it is carried by the insurance companies to great perfection. The company insures each one of those one hundred houses, receives its annual premium in the case of each, and runs a certain risk in regard to every one; but the risk is very small, and, as a general rule, the premiums paid in in the course of ten or twenty years, amount to a great deal more than the losses by fire that have to be paid back. If the owner of one of these hundred houses does not insure it, and the house takes fire and burns up, then he has to suffer the loss himself. If he does insure it, and the house then burns up, all he has to do is to go to the company which insured him and they pay him the "risk," taking for that purpose money which has been paid in at various times by the other policy holders in their premiums. Thus the treasury of an insurance company is a kind of bank, to whose funds all the policy holders contribute a just and specified sum year by year, with the understanding that whoever loses his property by the kind of disaster against which it was insured, is to have its value, or the amount for which it was insured, paid back to him. An insurance company will seldom, if ever, insure such property as a house up to its full value. They reason thus: if we insure this house up to its full value, the owner, if he should want money and not be able to sell his house, might be tempted to burn the house up on purpose, for the sake of getting his insurance. Companies are further very particular to know the character of the property they insure. If it be a ship, they want to know how it is built, whether its timbers are good and its fastenings secure, so that it can well stand the winds and the waves. If it is not a staunch ship, or if its expected voyage is to be an uncommonly perilous one, so as to make the risk extra which they take in insuring it, then an extra premium is demanded. So of a house; the amount of the premium depends often upon its situation and surroundings. Is it near other houses? Is there a stable connected with it? Is its roof shingled or slated? All these questions determine the danger of fire, and the amount of risk taken by the company, and so fix the amount of premium required. Insurance of stores and shops and factories is always more costly than that of dwelling houses, because buildings of that description are always in much greater danger of fire. Some kinds of property the companies will not insure at all, unless at rates so very high that the owners prefer to take the risk themselves.

There are two kinds of insurance companies. Sometimes a number of wealthy men organize themselves for the purpose, contribute a large sum of money as a fund, and divide the profits of the business among themselves. Such an insurance company is called a *stock company.* Sometimes, on the other hand, a number of citizens combine under an agreement to insure themselves, the body-at-large assuming the risk of each individual; whatever profits may arise being divided in the same way. This is called *mutual insurance.* This seems to be a kind of way of fulfilling the Scriptural injunction: "Bear ye one another's burdens."

In view of the fact that Mr. Stowe had built Mr.

Merrill's house by contract, and as long as the actual work of building was going on, all risk of fire rested upon Mr. Stowe, and he had taken care to provide against that by insuring the very frame as soon as it was up, adding little by little to the amount of the policy, as the work extended, and the value of his investment in it increased. But now that the house was finished, and turned over to the owner, Mr. Stowe's risk ceased; except that the policy he had taken out happened not to expire until the tenth day of the following month, October, which gave Mr. Merrill time to renew it in his own name. And this, though it has taken us a long time to reach the point, was the precise nature of his errand to the city.

The ride was a very pleasant one of about an honr. On reaching the city and leaving the car, Mr. Merrill led the way from one street to another, into State Street, and into one of the great buildings which line its sides. This building was full of offices, the directions to which were given by signs posted up against the door.

"I think this is the place," said he. "Let us see if we can find Mr. Kemp's name."

In a moment, Max, running his eye over the signs, found it.

"Yes papa, there it is. See! 'A. J. Kemp, Insurance, Room 14.'"

One flight of short stairs brought them to his office. It was a large and pleasant room, looking out upon the street below. Two or three handsome tables stood about the floor, and at one side was a high desk, with two sides to it, covered with huge account books, at one of which a clerk was busily writing. Mr. Kemp, himself, was sitting at a private desk of his own, behind a little railing, reading a newspaper.

In a few words Mr. Merrill explained his business, and Mr. Kemp, after asking him a few questions about his house, and its location, made a memorandum of the name of the street, the character of the building, the amount of the insurance, and one or two other matters which were to be mentioned in the policy.

"Well, now about furniture," continued Mr. Kemp, "You want something on your furniture, don't you?"

Mr. Merrill laughed. "To tell the truth," said he, "we have n't any furniture now. That is yet to be got." At which Max interrupted by whispering, "Why papa, there is the piano, and the pictures, and the old clock. And the six kitchen chairs, too," he added. Max did not exactly like the idea of being represented as belonging to a family which had absolutely no furniture at all.

"Oh, well," rejoined Mr. Kemp. "I understand. But you'll have some furniture in soon, I suppose. Perhaps I'd better write you a policy of five hundred on household furniture, etc., and then you can add to it afterward, as you want to."

"Very well," replied Mr. Merrill.

"By the way, Mr. Kemp," he continued, "how is it about lightning? If our house is struck by lightning and set on fire, does your policy hold against loss?"

"Yes," said Mr. Kemp, "that is, against loss by *fire*, not by lightning. Sometimes, you know, lightning tears a house up without setting it on fire. We don't assume *that* risk; and our policies don't read against fire by lightning, but we should pay 'em just the same. We always have."

"And how about lightning-rods?" asked Mr. Merrill. Do you make any difference in the premium whether a house has rods or not?"

"No," replied Mr. Kemp,

"Then you don't think they're much of a protection?"

"Well, we 've never taken account of them in our office. Some people think they 're safer with them; but we don't require rods."

This ended the business. Mr. Merrill bade Mr. Kemp good-bye, and, followed by Max, took his departure. As they went down stairs, he said:

"Well, Max, I think we'll not have our house rodded *this* fall. As long as the insurance companies feel safe in letting it go as it is, I think *we* may. We may be pretty sure that if, in the long run, lightning rods were an actual protection to houses they would know of the fact at the insurance offices, and we should have to put them up."

CHAPTER XXI.

A PRIVATE FIRE DEPARTMENT.

ON their way home from the insurance office, Max and his father were destined to witness an instance of the very evil for which fire insurance provides a remedy, and to receive a very valuable suggestion with reference to the better protection of the house at Long Look. This was nothing else than a veritable fire.

They had passed out of State Street, and had got part way across the city to the corner where they were to take the return horse-car for home (for Mr. Merrill had made his arrangements not to go to his place of business that day), when their attention was arrested by an unusual commotion a little way in advance of them. There was a sudden movement on the part of the people in the street, a communication of some sort seemed to pass rapidly from one to another, a few stopped and turned around to look, others began to run, and presently a crowd was seen to be gathering before a tall building a block or two away. A moment more and a puff of dark smoke, followed by a tongue of flame, burst out of one of the upper windows, and the cry of "Fire!" rang out above all the din of the pavements. In another moment the bells began to sound the alarm.

"It's a fire!" exclaimed Mr. Merrill.

"Yes," replied Max, excitedly, "I see the smoke."

"Let's get up here out of the way," said his father. Instead, however, of stopping just where they were, which was at some little distance from the fire, they pushed along to the next block, where they were considerably nearer, and by dint of a little crowding, for the street had filled up with astonishing rapidity, they succeeded in reaching the topmost step of a flight which led up to a door, where they were safely out of the way and yet had an admirable view of what was going on.

Already the scene had become an exciting one. Thousands of people had poured into the street, and the pavement as well as the sidewalks was black with the moving throng. Far and near, wherever a window was to be seen, there was a head thrust out of it, and sometimes there were two heads and even more; looking to obtain, if possible, a glimpse of the fire. Several bells were now ringing the alarm with measured strokes. Meantime the smoke from the burning building grew denser and blacker as it issued from the windows and rolled away into the air. Max felt at first a little uneasy at being so near the fire, for although on the opposite side of the street, it was not many doors below them; but his father seemed to feel entirely safe, as indeed they were; and so he braced up his courage.

"Why don't the engines come," he asked.

"They'll be here very soon," replied his father. "We shall hear the signal in a moment, I've no doubt. You see it takes some little time for the engines to get started after they hear the alarm, and it takes some little time to give the alarm in the first place."

"How do they give the alarm," asked Max.

"By telegraph," replied his father. "There are fire alarm telegraph wires running all over the city. They are connected with the alarm bells and with the engine houses; and there are signal boxes at convenient and prominent places along the streets. When a fire breaks out, whoever discovers it runs to the nearest signal box, and gives the alarm; and the engine gets to the fire at the earliest possible moment."

"But how does the engine know where the fire is?" asked Max.

"The signal-boxes are all numbered," replied his father, "one, two, three, four, and so on; and the apparatus is so arranged that the signal from any given box is always the *number* of that box. If the box is numbered sixty-four, the signal is sixty-four; that is, six strokes of the bell, followed, after a short pause, by four strokes. When the men in the engine house hear that signal, or *any* signal, they know at once from what box it comes, and so they can tell very nearly in what part of the city the fire is."

While Mr. Merrill had been giving this explanation the first engine was heard approaching in the distance. It was a ponderous machine on four wheels, having a faint resemblance to a locomotive, only very much more bright and shiny by reason of the brass and copper metal out of which its outside parts were made; and it was drawn by two large and strong horses who came on at a gallop, driven by a man who rode on the forward part of the engine. By some mechanism the engine was made to strike a warning bell as it proceeded, by which means the people who blocked up the street had notice to get out of the way. The engine had already fired up, and a volume of black smoke was pouring out of the smoke stack as the machine thundered by. Altogether it was rather a terrible looking object. As soon as it reached the burning building it stopped, and the men in charge made all haste to complete their connections with the hydrants and to get a stream of water upon the fire. But all this took time, and meanwhile the fire burned more fiercely than ever, so that before the firemen got fairly to work with their engine it seemed as if pretty much the whole building was given over to the flames.

"That's the trouble with fire-engines," said Mr. Merrill, as he and Max stood watching the getting of the hose into service; "it takes so long for them to get to work. The most important moments for putting out a fire are the moments when it first begins to burn; and these are just the moments when engines can't do anything. By the time the engine is at work, the fire has spread so far that it is sometimes beyond control."

It proved largely so in this case. The building was a very inflammable one, and the flames, after they were once fairly started, raged with great fury. Another engine presently arrived, and then another, and before long all were at work, but it soon became evident that the building was doomed. There had probably been a moment at the first outbreak of the fire when a bucket of water well directed would have extinguished it, but now it was almost too much even for three powerful engines.

"Do you think that store is insured, papa?" asked Max.

"I don't know," replied his father, "but I hope so for the owner's sake. It looks to me as if it were going to be all burned up."

Just at this moment Max, happening to look a little one side, caught sight of a new disaster. But a few steps beyond where he and his father were standing, and so nearer to the fire, was a broad canvas awning suspended over the sidewalk so as to afford shade to the lower windows of the store with which it was connected. A cinder, wafted by the wind from the building opposite, had fallen upon this awning and set it on fire. So absorbed was everybody by the greater conflagration and the stubborn fight which the gallant firemen were waging with it, that this new outbreak had been observed by no one, not even by the proprietor of the store himself, who had come out in his shirt-sleeves to the curb-stone, the better to watch the scene. And there was the awning over his head fairly flaming.

"Papa! Papa!" exclaimed Max, "look! see! that awning's on fire!"

The words were spoken in so loud and excited a voice as at once to catch the ear of the man below, who, turning, looked up, and in an instant took in the situation. Quick as a flash he disappeared in his store and in a moment returned carrying in one hand a pail which appeared to be full of water, and in the other a curious instrument consisting in part of a long iron tube, with a handle at one end, and in part of a short and flexible pipe or hose, with a nozzle. Placing the open end of the brass tube in the pail of water and his foot on the pail to steady it, he seized the handle with one hand and the nozzle of the hose with the other, and began to pump away with great vigor. Instantly a small but powerful stream of water was forced through the hose in the direction of the burning awning.

"Play away, Number One!" shouted somebody on the sidewalk.

Almost before Mr. Merrill and Max could adjust their minds to this new emergency, the hand-pump, for such it really was, had done its work, and the awning which had been smoking was now dripping.

"Well done!" said Mr. Merrill. "That *is* a contrivance. That's the best thing I've seen yet to put out fires with. If they had had a pump like this over *there*, that fire would never have made the headway it has now. Let's go and look at it."

Accordingly, descending from the steps, Mr. Merrill led the way to where the man with the shirtsleeves was still standing, pail and pump in hand; surrounded by a curious crowd, whose attention, like

Max's and his father's, had been diverted to this matter of the awning. The man seemed quite proud of his "hand engine," as he called it, and he exhibited and explained it with great willingness.

"The value of such an engine as this," said he, "is that you can take a fire in time, when you first see it. If I'd had to send for a steamer to put out that awning, we might have been in a general blaze before it came. Your big engines are all very well, when a fire 's got under way, but I'd rather take my chances for putting out a fire before it gets under way, and this is the thing to do it with."

Mr. Merrill was greatly delighted with the hand-engine. "We'll have one this very day, Max," said he. The man gave him the street and number of the store where one could be bought, and he wrote it down in his memorandum-book, resolving that as soon as he and Max were ready to go, they would proceed to the store at once and make the purchase.

By this time the firemen seemed to have become masters of the situation. The interior of the building had been pretty well burned out, but the front wall was left standing, and through the windows it was possible to look in upon the still fiery mass beyond. The street in front had been cleared of people by policemen, who had stretched ropes across it both above and below, and only the firemen were allowed to enter the space thus enclosed. This was partly to prevent interference with their movements by the crowd, and partly to prevent accidents to the crowd, that might have occurred by the falling of any part of the walls.

After waiting a little longer, Max and his father concluded to go. The throng in the street had very much diminished with the dying out of the fire, and they got away from the spot without any difficulty. It was not a long walk to the store where hand-pumps were for sale. Besides a pump Mr. Merrill bought a pail. It was a very handsome one, painted white on the inside and blue on the outside. Max said he was sure there were several pails at home, and he thought that one of those would do. His father admitted that this was very likely so, but he explained to Max that a great part of the advantage of this "private fire department," as he called it, would consist in having the apparatus always in place and ready for instant use.

"The value of our hand-pump in putting out a fire," said he, "will lie in our being able to use it, if we ever have to use it at all, the moment the fire is discovered. If, on the discovery of a fire, we have to run all over the house to find a pail, and then have to go and fill the pail with water, and then in like manner have to hunt up the pump, all our anticipated advantage will be lost, and we might about as well depend on the steam fire-engine in the first place."

In due time Mr. Merrill and Max arrived at home, Max carrying the pump and his father the pail. Jenny and Maud met them at the door, and were quite curious to know what sort of a thing it was which Max carried in his hand. As for the pail, *that* needed no explanation. Max at once asked permission to take the pump out into the yard and show his little sisters how it worked. To this his father readily consented, and the next half hour was spent very happily in illustrating the true way of extinguishing fires. Max filled the pail with water at the faucet in the cellar. The children made believe that a bush in the middle of the yard was the fire, and they had a great time putting it out. The little pump proved to be really very smart, and threw its stream of water quite a distance into the air. Maud called it "a squirter." Jenny, I am sorry to say, got in the way once when Max was working it, and in consequence her dress was badly soaked.

After all this play had been ended, the pump and the pail were brought into the house, and Mr. Merrill proceeded to consider where would be the best place to keep them. After consulting with Mrs. Merrill and Carry Ann, it was finally decided that the best place would be in the hall on the second story, near the head of the back stairs. This was about the center of the house, and would be easy of access from all the rooms. He fastened two hooks into the wall, a short one to hang the pump on, and a long and stout one to hang the pail on. He put a little water in the pail, just enough to keep it from getting too dry, and so shrinking and falling apart.

"There," said he, when the pump and pail were finally in their place; "now we have a private fire department of our own, and if our house ever takes fire we sha'n't have to wait till the steam fire-engine comes before we begin to put the fire out. I verily believe this will be more of a protection than lightning

OFF FOR "OUT DOORS."

[illegible] would be, and it hasn't cost a twentieth as much."

"Besides," said M[illegible] "we [illegible] use it to [illegible] with, and that's f[illegible]

"Yes," replied [illegible] you get [illegible] clothes wet. There is [illegible] much [illegible] about that."

"[illegible]" said Mrs. [illegible] it, [illegible] we [illegible] have used it [illegible]"

"[illegible]" said M[illegible] we have been wait[illegible] in va[illegible] fre[illegible]

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Altogether [illegible] day, and a[illegible] a safeguard [illegible] proved a very p[illegible]

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OFF FOR "OUT DOORS."

rods would be, and it has n't cost a twentieth part as much."

"Besides," said Maud, "we can use it to squirt water with, and that's fun."

"Yes," rejoined Jenny, "unless you get your clothes wet. There is n't much fun about that."

"*I* think," said Mrs. Merrill, "that it will be very useful to water my plants with."

"Yes!" exclaimed Maud, eagerly, "we' ve been watering a great bush with it. We played it was a fire."

"But I mean *real* watering," said Mrs. Merrill. "It will be very easy, next spring, to take out a pail full of water and drench all the flowers. I think it will be better than a watering-pot."

Altogether, for purposes of work and play, and as a safeguard against a possible fire, the "hand engine" proved a very profitable investment.

Here, for the present, we must take our leave of Max and his sisters and their father and mother, though their life in the new house at Long Look was but just begun. What came after their moving in must be even more interesting, I am sure, than what went before. There was a yard to be cleared up and laid out, and a great deal of work and play went on therein. There was an indoor life to be organized, with studies to be planned, and discipline to be maintained. There were various excursions hither and thither, and adventures pleasant and unpleasant, in great variety. There was a summer which the children spent away with Carry Ann on her father's farm in a back township of Maine, and there was a visit by all to the great Centennial Exhibition in Philadelphia. About some of these things my readers, if they should like to listen more, may be told by and by. Of "Out Doors at Long Look," at least, I will begin to write right away.

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